

Forest Community Types Native to the Bankhead National Forest

The Forest Health and Restoration Project for the Bankhead National Forest proposes a future forest landscape aimed at sustaining a representation of forest community types and all associated plant and wildlife species, that are native to the Southern Cumberland Plateau region. This conservative approach was first described by Aldo Leopold (1949) as "keeping all the pieces." The desired condition recognizes the Cumberland Plateau primarily as a deciduous forest landscape, with a smaller representation of fire-dependent pine and oak woodland conditions. Emphasis would be placed on maintaining forest and plant community types not abundant on private lands. This future landscape also includes a representation of old-growth forests for all native forest community types, high quality aquatic habitats, intact riparian forests, and the conservation of key rare community types such as rock outcrop and cliff areas, forest glades, and caves.

These community types, adapted by Southern Appalachian planners, are based on the old-growth community types (USDA Forest Service, 1996) and are as follows:

- Mixed Mesophytic Forest
- Dry-Mesic (somewhat moist sites) Oak Forest
- Dry to Dry-Mesic Oak-Pine Forest
- Dry and Xeric (very dry sites) Oak Forest and Woodland
- Xeric Pine (Shortleaf) and Pine-Oak Forest and Woodland
- Upland Longleaf Pine/Bluestem Woodland

These forest community types are described below.

Mixed Mesophytic and Western Mesophytic Forest Community Description

Western mesophytic forests are found in provinces in western portions of the Southeast and the mixed mesophytic forests can be found primarily in the southern Appalachians (table 1). Western mesophytic forests occur on a wide range of topographic positions, including drier sites than mixed mesophytic forests, which occur on lower north- and east-facing slopes and mesic coves up to an elevation of about 5,000 feet. In less mountainous terrain, they may cover the entire landscape where conditions are suitable.

Western mesophytic forests are typically dominated by oaks, but also include many of the species of the mixed mesophytic forests, which are among the most biologically diverse ecosystems of the United States. Species dominance patterns vary with geographic location and site condition, such as topographic features, moisture, and fertility.

Of 25 to 30 characteristic species the following are the most common: sugar maple (*Acer saccharum*), beech (*Fagus grandifolia*), hemlock (*Tsuga canadensis*), silverbell (*Halesia carolina*), yellow poplar (*Liriodendron tulipifera*), red maple (*A. rubrum*), white oak (*Quercus alba*), northern red oak (*Q. rubra*), yellow birch (*Betula alleghaniensis*), yellow buckeye (*Aesculus flava*), and basswood (*Tilia americana*) (table 2). Yellow buckeye and basswood are indicator species for the mixed mesophytic forests, but yellow buckeye is absent from western mesophytic forests. The age structure of the old growth is broadly uneven aged or all aged. Irregular distributions are common and reflect severe natural disturbances or irregularities in seed production (Greenberg and others, in preparation).

Disturbance

The creation of relatively small canopy gaps from the death of a group of trees is the driving “background” disturbance and accounts for a relatively constant turnover of trees and species in mixed mesophytic forests. Estimates of canopy turnover rates vary from less than 0.4 to 1.0 percent annually. Less frequent, large-scale disturbances such as severe windstorms, ice storms, floods, landslides, fire, damage by native or non-native insects, or fungal infections may also create openings. The shade tolerance of different species (as well as the initial composition of species and their regeneration strategies) influence tree regeneration in relation to the size and age of the gap.



Example of a Mixed Mesophytic Forest Community

Dry-Mesic Oak Forest Community Description

Dry-mesic oak forests occur throughout the South in all ecological provinces (table 3), most commonly in the mountains. They are usually found on dry, upland sites on southern and western aspects and ridgetops (Nowacki 1993).

The species composition of this forest type varies greatly due to its wide distribution. The major species include chestnut oak (*Quercus montana*), northern red oak (*Q. rubra*), black oak (*Q. velutina*), white oak (*Q. alba*), and scarlet oak (*Q. coccinea*). Additional associates include southern red oak (*Q. falcata*), post oak (*Q. stellata*), blackjack oak (*Q. marilandica*), pignut hickory (*Carya glabra*), mockernut hickory (*C. tomentosa*), and red maple (*Acer rubrum*) (table 4). Coniferous species such as shortleaf pine (*Pinus echinata*), eastern white pine (*P. strobus*), and table mountain pine (*P. pungens*) may occur as a mixture, with an overstory coverage of less than 25 percent. American chestnut (*Castanea dentata*) was a major species in this forest community type up until the 1930's (Nowacki 1993).

The scarlet oak and chestnut oak stands (national forest [CISC] forest types 52, 59, and 60) associated with dry-xeric conditions are included in the dry and xeric oak forests, woodlands, and savanna community type.

Disturbance

The frequency of fire is important in the disturbance regime for this community type. The dry sites on which this community type occurs are conducive to recurring, low-intensity surface fires thought to have been quite common prior to European settlement. These fires helped maintain the oak component by eliminating fire-sensitive competitors and stimulating oak regeneration (Nowacki 1993). Furthermore, blowdowns of single or multiple trees result in gap phase regeneration, and infrequent tornadoes can destroy an entire stand. Other important disturbances for this community type include oak decline, infestations by gypsy moths, and ice storm damage.



Example of a Dry-Mesic Oak Forest Community

Dry and Dry-Mesic Oak-Pine Forest Community Description

Dry and dry-mesic oak-pine forests constitute a large part of the eastern deciduous forest, extending from southern Missouri and east Texas in the west to the Atlantic coast from New Jersey to north Florida (table 5). Most of these forests occur on coarse-textured soils on ridges and south-facing slopes in the mountains and droughty uplands in the Piedmont and Coastal Plain (White and Lloyd, in preparation). The oak-pine forest community type consists of least 20 percent of the basal area in pine and at least 20 percent in oak.

The dry and dry-mesic oak-pine and dry-mesic oak forest community types may develop on the same type of sites depending on type and intensity of disturbances. Across the east, shortleaf pine (*Pinus echinata*) and white oak (*Quercus alba*) are the most common canopy species, whereas pitch pine (*P. rigida*), scarlet oak (*Q. coccinea*) and chestnut oak (*Q. prinus*) are more common in mountainous areas. Other common canopy species include Virginia pine (*P. virginiana*), table mountain pine (*P. pungens*), post oak (*Q. stellata*), blackjack oak (*Q. marilandica*) on dry sites and loblolly pine (*P. taeda*), southern red oak (*Q. falcata*), black oak (*Q. velutina*), mockernut hickory (*Carya tomentosa*), pignut hickory (*C. glabra*), and red maple (*Acer rubrum*) on dry-mesic sites (table 6). Ericaceous species, such as blueberry (*Vaccinium* spp.), huckleberry (*Gaylussaccia* spp.), and mountain laurel (*Kalmia latifolia*), typically dominate the shrub layer, while dogwood (*Cornus florida*), sourwood (*Oxydendrum arboreum*), sassafras (*Sassafras albidum*), and blackgum (*Nyssa sylvatica*) are common in the midstory. Common understory and vine species include sedges (*Carex* spp.), panicum grasses (*Panicum* spp.), broom sedge (*Andropogon* spp.) and other grasses, pipsessewa (*Chimaphila maculata*), beggar's ticks (*Desmodium* spp.), bracken fern (*Pteridium* spp.), greenbriar (*Smilax* spp.), Virginia creeper (*Parthenocissus quinquefolia*), and grapes (*Vitis* spp.). Currently a lower frequency of fires is resulting in species composition changes.

Disturbance

The dry and dry-mesic oak-pine forest community type is transitory on a given site. Historically, fire, aboriginal activities, windfall, natural mortality, and other disturbances maintained this forest community type. Disturbances vary across its range, with lightning fires prevalent in the Coastal Plain and Ozark Mountains, hurricanes in the Coastal Plain, and tornadoes in the Ouachita and Ozark Mountains. Fire is less frequent in the Appalachian Piedmont and Mountains. The frequency of natural fires is estimated at between 5 and 32 years throughout the Southeast (White and Lloyd, in preparation). Beyond a certain gap size (0.1 acre in the Piedmont), fire (or other forest floor disturbance) is the limiting factor for maintaining this forest community type.



Example of a Dry and Dry-Mesic Oak-Pine Forest Community

Dry and Xeric Oak Forest, Woodland, and Savanna Community Description

Dry and xeric oak forests, woodlands, and savannas are found throughout the southeast in all ecological provinces. They usually occur on very dry and infertile uplands (table 7). They also occur on steep, south-facing slopes or rock outcrops. Soils are usually coarse textured, and dry soil conditions may prevail most of the year (Tyrrell and others, in preparation).

Two recognized subtypes occur in the South: the “widespread” subtype and the southern subtype. The southern subtype is associated primarily with longleaf (*Pinus palustris*) or slash pine (*P. elliottii*) communities in the Coastal Plain and oak barrens located in the western portion of region. The southern subtype community is made up of small-statured trees that include turkey oak (*Quercus laevis*), bluejack oak (*Q. incana*), sand post oak (*Q. margaretta*), Mohr’s oak (*Q. mohriana*), and sand live oak (*Q. geminata*). Larger trees such as live oak (*Q. virginiana*) may also be present (table 8).

The “wide spread” subtype includes black oak (*Quercus velutina*), post oak (*Q. stellata*), blackjack oak (*Q. marilandica*), chestnut oak (*Q. montana*), scarlet oak (*Q. coccinea*), and white oak (*Q. alba*) as the major species (Nowacki 1993).

Disturbance

Periodic surface fires are important for maintaining the open condition of this forest community type. Fires are thought to have burned frequently enough to restrict tree density and promote the growth of shade intolerant grasses, forbs, and shrubs (Nowacki 1993).



Example of a Dry and Xeric Oak Forest, Woodland, and Savanna Community

Xeric Pine and Pine-Oak Forest and Woodland Community Description

Xeric pine and pine-oak forests and woodlands are found throughout most of the eastern United States, from southern Missouri and northeast Texas east to the Atlantic coastline from southern Maine to South Carolina (table 9). Because this forest community type covers a broad geographic range, there are distinctive differences between the communities separated by the Mississippi River. All principal species discussed below are found in the communities east of the river. However, shortleaf pine (*Pinus echinata*) is the only pine species which occurs west of the river and chestnut oak is confined to the region east of the river. Xeric pine and pine-oak forests and woodlands typically occur on ridgetops and south-facing upper slopes in the mountains or on excessively-drained, sandy uplands in gentler terrain, such as in the Piedmont (Murphy and Nowacki, in preparation).

This forest community type normally exists on strong acidic soils with extreme moisture and nutrient deficiencies. Xeric site conditions may exist due to: (1) low precipitation, (2) limited moisture absorption/retention because of exposed bedrock, steep slopes, coarse-textured soils, rocky soils, or shallow soils, and/or (3) elevated evapotranspiration rates on southern-facing slopes. Principal overstory species of this community type include pitch pine (*P. rigida*), Virginia pine (*P. virginiana*), shortleaf pine, eastern white pine (*P. strobus*), table mountain pine (*P. pungens*), and chestnut oak (*Quercus prinus*) (table 10). Associated species include scarlet oak (*Q. coccinea*), black oak (*Q. velutina*), blackjack oak (*Q. marilandica*), post oak (*Q. stellata*), northern red oak (*Q. rubra*), southern red oak (*Q. falcata*), white oak (*Q. alba*), and pignut hickory (*Carya glabra*) (Murphy and Nowacki, in preparation).

Disturbance

Due to the prevailing xeric conditions and chemical content (volatile resins and pitch) of most plant species occurring in this community type, these forests and woodlands have historically experienced frequent fires. Most fires were probably low intensity, surface burns since they occurred frequently and did not allow significant amounts of fuel to build up, although occasional fires occurred in some areas that destroyed an entire stand. On sites where moisture and nutrients are not as limiting, periodic fires are required to maintain a dominance of yellow pines, because pine seedlings rarely become established in oak litter. Over many decades, increases in the amount of dead biomass can predispose these forests and woodlands to resource damaging wildfires, especially in older stands that have experienced mortality caused by southern pine beetles. In the absence of fire, successional changes on xeric sites are normally quite restricted. On other sites, succession in the absence of fire leads to a dominance by oaks and/or white pine along with other shade tolerant and fire intolerant species (Murphy and Nowacki, in preparation).

Ice or glaze storms along with strong winds often cause extensive uprooting or blowdown of trees in these stands. These disturbances typically form large light gaps, and the downed biomass increases fuel loads which may lead to high-intensity fires.



Example of a Xeric Pine and Pine-Oak Forest and Woodland Community

Upland Longleaf Pine Forest, Woodland, and Savanna Community Description

The upland longleaf pine forest, woodland, and savanna community type can be found from Virginia south through central Florida and west to east Texas, with extensions into the Appalachian Piedmont and Mountains of north Alabama and northwest Georgia (table 11). On the Coastal plains, this forest community is typically found on sandhills, although in central and south Florida, it occurs on slight rises in flatwoods. In the mountains, it is usually restricted to sites that are apt to burn, specifically ridge tops and middle and upper slopes with south and southwest exposures (Nowacki 1993).

In this forest community type the dominant canopy tree is longleaf pine (*Pinus palustris*), providing relatively dense to patchy and very open canopies. These communities have frequent transitions in ages, tree sizes, and tree density. Sometimes associated with this forest community type are clusters of deciduous scrub oaks, evergreen scrub oaks, and mesic hardwoods (table 12). The groundcover consists of hundreds of species of herbs and low shrubs sometimes dominated by wiregrass (*Aristida stricta* and *A. beyrichiana*) in the eastern portion of its range and by bluestem grasses (*Schizachyrium tenerum* and *S. scoparium*) in the western portion (Landers and Boyer, in preparation).

Disturbance

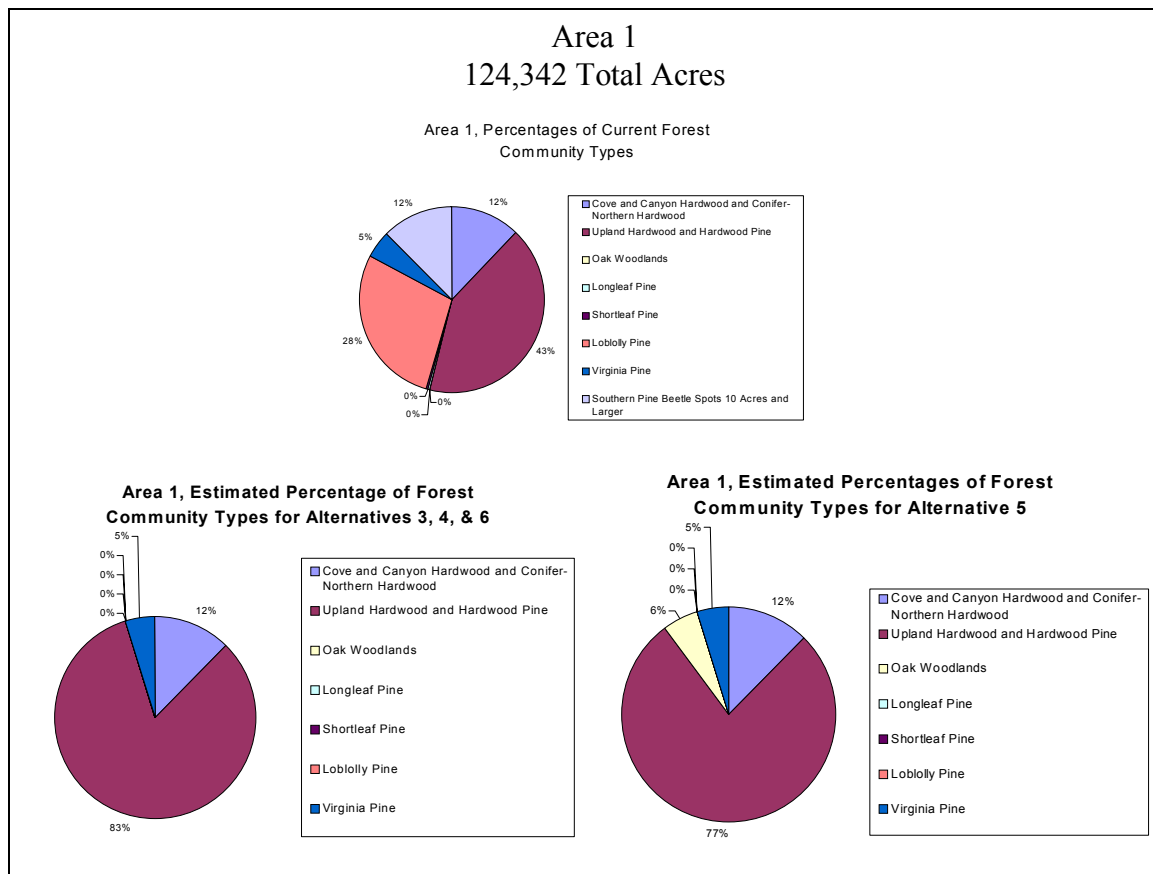
Fires during the growing season are the major disturbances in the upland longleaf and south Florida slash pine communities. In most instances, the frequency of fires associated with maintaining longleaf pine is estimated to be every 2 to 4 years. In the Coastal Plain sandhills and transition areas, the frequency is estimated to be 3 to 10 years. In addition to normal fire regimes, other disturbances include lightening, wind events (e.g., tornadoes, tropical storms, and microbursts), and periodic droughts that result in conditions conducive to intense fires (Landers and Boyer, in preparation).

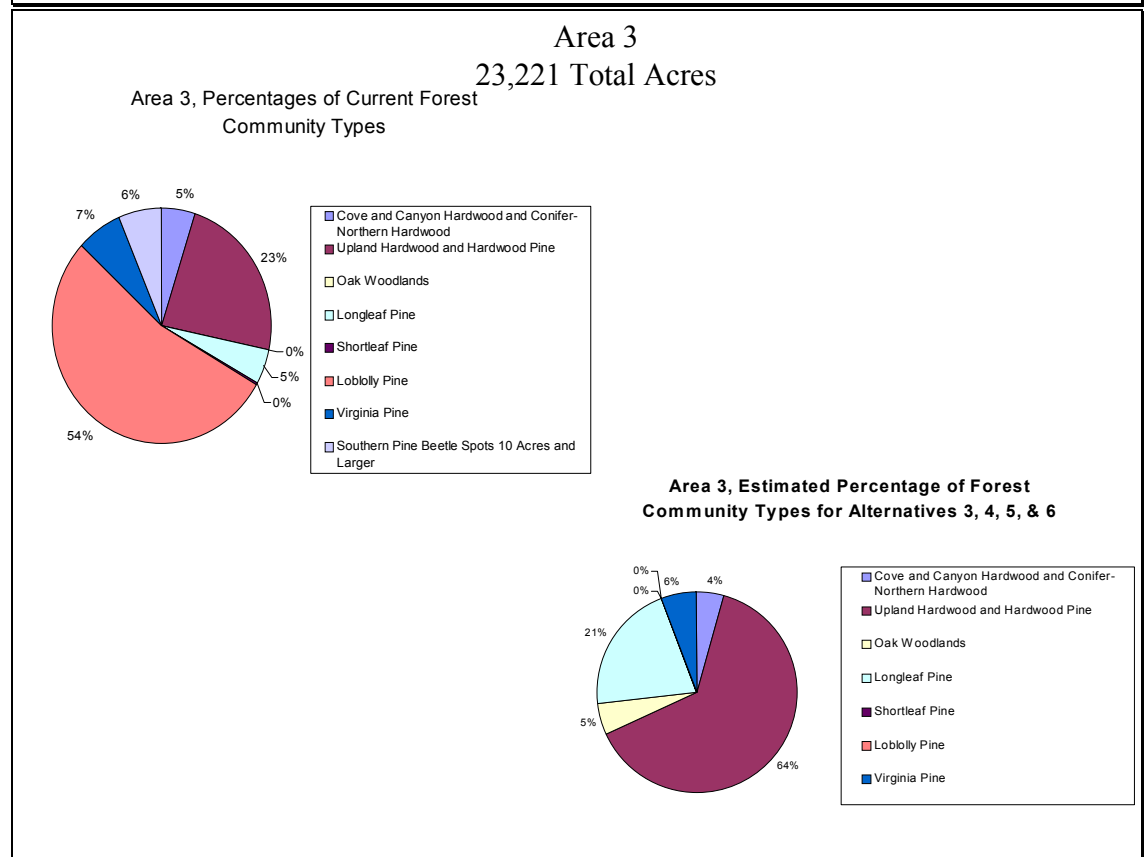
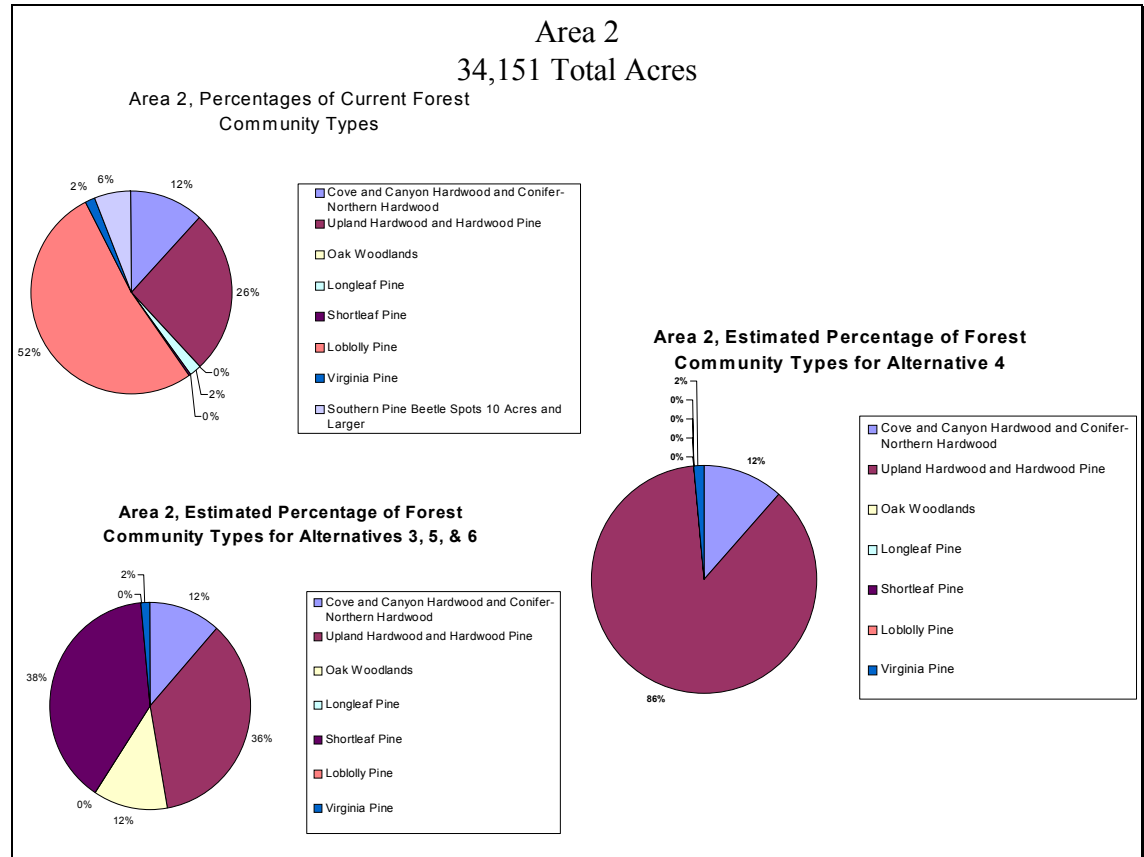
The following charts show the current percentages by community type as compared to the predicted percentages by community type by Area for the action alternatives.



Upland Longleaf Pine Forest, Woodland, and Savanna Community

Comparison of Community Types by Area





Alternative 2 Proposed Actions List

Alternative 2 Thinning Stands				
Compt.	Stand	Acres	DFC	Year
Area 1 Thin				
1	19	19	H	2004
3	11	8	H	2005
3	17	32	H	2005
3	24	23	H	2005
4	1	41	H	2006
4	8	34	H	2006
4	12	40	H	2006
4	14	148	H	2006
4	20	167	H	2006
4	32	37	H	2006
5	1	89	H	2008
5	5	23	H	2008
5	9	56	H	2008
5	16	52	H	2008
5	23	44	H	2008
5	29	19	H	2008
5	30	4	H	2008
5	32	15	H	2008
6	4	35	H	2004
7	2	30	H	2008
7	10	93	H	2008
7	11	33	H	2008
9	2	74	H	2008
9	5	13	H	2008
9	7	26	H	2008
9	11	37	H	2008
9	14	23	H	2008
9	16	58	H	2008
10	2	54	H	2008
10	6	75	H	2008
10	10	38	H	2008
10	11	9	H	2008
10	14	47	H	2008
10	18	75	H	2008
13	18	12	H	2005
13	25	28	H	2005
13	27	33	H	2005
14	12	56	H	2005
14	14	49	H	2005
14	16	41	H	2005
15	3	39	H	2004
15	5	37	H	2004

Alternative 2 Restoration Stands					
Compt.	Stand	Acres	DFC	Treatment	Year
Area 1 Restore					
5	18	16	H	HT	2005
5	30	11	H	HT	2005
6	13	11	H	HT	2006
7	10	55	H	HT	2005
9	5	76	H	HT-PF	2006
9	11	18	H	HT-PF	2006
10	11	23	H	HT-PF	2006
10	15	32	H	HT-PF	2006
15	13	44	H	HT-PF	2006
15	24	41	H	HT-PF	2006
16	1	34	H	HT	2006
16	10	9	H	HT	2006
18	4	65	H	HT-PF	2007
18	17	10	H	HT-PF	2007
18	19	1	H	HT-PF	2007
22	17	17	H	HT-PF	2005
22	26	33	H	HT-PF	2005
23	6	35	H	HT	2005
23	15	42	H	HT-PF	2005
24	1	13	H	HT-PF	2006
29	3	25	H	HT-PF	2006
36	8	67	H	HT	2005
36	10	32	H	HT	2005
36	14	21	H	HT	2005
37	2	17	H	HT-PF	2005
37	10	11	H	HT-PF	2005
37	13	13	H	HT-PF	2005
37	15	15	H	HT-PF	2005
37	16	23	H	HT-PF	2005
38	1	31	H	HT	2007
38	5	21	H	HT-PF	2007
38	7	46	H	HT-PF	2007
38	11	33	H	HT-PF	2007
39	23	10	H	HT	2007
39	27	27	H	HT	2007
39	29	17	H	HT	2007
39	31	25	H	HT	2007
39	32	22	H	HT	2007
42	12	16	H	HT	2007
42	22	12	H	HT	2007
42	27	13	H	HT	2007
42	33	16	H	HT	2007

Compt.	Stand	Acres	DFC	Year
15	6	18	H	2004
15	8	25	H	2004
15	10	28	H	2004
15	11	45	H	2004
16	1	76	H	2004
16	5	25	H	2004
17	6	54	H	2004
17	13	41	H	2004
18	4	56	H	2005
18	7	28	H	2005
18	11	33	H	2005
18	16	29	H	2005
18	30	2	H	2005
22	9	32	H	2008
22	19	30	H	2008
22	23	50	H	2008
22	27	40	H	2008
22	29	20	H	2008
23	1	25	H	2008
23	2	8	H	2008
23	5	25	H	2008
23	7	21	H	2008
23	15	121	H	2008
24	12	33	H	2008
24	20	8	H	2008
24	21	24	H	2008
29	3	53	H	2005
29	6	37	H	2005
29	7	8	H	2005
29	8	42	H	2005
29	11	76	H	2005
30	2	28	H	2007
30	5	30	H	2007
30	8	33	H	2007
30	14	36	H	2007
30	15	27	H	2007
30	18	35	H	2007
35	23	25	H	2005
36	10	14	H	2007
36	11	13	H	2007
36	14	32	H	2007
37	2	40	H	2007
37	7	30	H	2007
37	9	34	H	2007
37	10	33	H	2007
37	13	23	H	2007

Compt.	Stand	Acres	DFC	Treatment	Year
43	4	70	H	HT-PF	2007
43	6	55	H	HT-PF	2007
45	2	61	H	HT	2007
45	4	49	H	HT	2007
46	3	39	H	HT-PF	2006
46	6	14	H	HT-PF	2006
49	20	31	H	HT	2007
51	8	18	H	HT	2005
51	11	23	H	HT	2005
52	13	10	H	HT	2005
52	27	11	H	HT-PF	2005
53	5	56	H	HT	2008
53	11	29	H	HT	2008
53	13	13	H	HT	2008
54	1	9	H	HT	2008
54	10	32	H	HT	2008
55	6	19	H	HT	2007
55	9	49	H	HT	2007
55	12	19	H	HT	2007
55	14	15	H	HT	2007
55	15	74	H	HT	2007
55	24	12	H	HT	2007
57	9	29	H	HT	2007
57	11	95	H	HT	2007
57	14	56	H	HT	2007
59	4	69	H	HT	2006
59	13	13	H	HT	2006
59	14	54	H	HT	2006
60	1	37	H	HT	2005
60	6	129	H	HT	2005
65	1	23	H	HT	2004
65	3	13	H	HT	2004
65	4	31	H	HT	2004
65	12	20	H	HT	2004
65	13	41	H	HT	2004
65	16	13	H	HT	2004
65	19	18	H	HT	2004
66	2	10	H	HT-PF	2004
66	3	19	H	HT-PF	2004
66	7	73	H	HT-PF	2004
67	6	16	H	HT	2004
67	11	61	H	HT	2004
67	12	34	H	HT	2004
68	6	70	H	HT	2004
68	8	27	H	HT	2004
68	9	80	H	HT	2004

Compt.	Stand	Acres	DFC	Year
38	3	34	H	2005
38	7	29	H	2005
38	11	19	H	2005
39	17	13	H	2006
39	19	8	H	2006
40	2	18	H	2006
40	3	74	H	2006
40	8	39	H	2006
40	10	53	H	2006
40	13	86	H	2006
40	14	76	H	2006
41	8	82	H	2007
41	11	22	H	2007
41	13	42	H	2007
41	15	20	H	2007
41	16	63	H	2007
42	3	13	H	2005
42	9	5	H	2005
42	12	34	H	2005
42	15	2	H	2005
42	21	114	H	2005
42	22	51	H	2005
42	23	9	H	2005
42	25	26	H	2005
42	26	35	H	2005
42	27	1	H	2005
42	29	63	H	2005
43	6	91	H	2005
43	20	50	H	2005
43	24	40	H	2005
44	1	31	H	2007
44	11	30	H	2007
44	12	31	H	2007
44	13	15	H	2007
45	13	41	H	2007
45	17	22	H	2007
46	4	16	H	2007
46	7	83	H	2007
46	14	156	H	2007
47	11	45	H	2007
49	6	28	H	2007
50	2	24	H	2007
50	6	43	H	2007
50	18	25	H	2007
50	26	22	H	2007
51	3	14	H	2007

Compt.	Stand	Acres	DFC	Treatment	Year
68	11	13	H	HT	2004
69	22	105	H	HT	2004
70	10	136	H	HT-PF	2005
70	15	43	H	HT-PF	2005
70	23	41	H	HT-PF	2005
70	28	19	H	HT-PF	2005
76	18	55	H	HT	2005
76	25	11	H	HT	2005
76	26	30	H	HT	2005
77	3	22	H	HT	2006
77	6	12	H	HT	2006
77	12	12	H	HT	2006
81	5	76	H	HT	2006
81	6	21	H	HT	2006
90	10	34	H	HT-PF	2006
90	16	24	H	HT-PF	2006
90	19	21	H	HT-PF	2006
90	20	46	H	HT-PF	2006
90	24	18	H	HT-PF	2006
91	4	12	H	HT	2006
91	6	21	H	HT	2006
92	4	12	H	HT	2006
92	13	61	H	HT	2006
92	24	15	H	HT	2006
93	5	14	H	HT	2006
93	11	21	H	HT	2006
94	1	47	H	HT-PF	2008
94	2	19	H	HT-PF	2008
94	7	35	H	HT	2008
94	11	35	H	HT	2008
95	11	51	H	HT-PF	2008
96	11	11	H	HT	2006
104	7	18	H	HT	2008
116	3	20	H	HT-PF	2004
116	6	13	H	HT-PF	2004
116	7	15	H	HT-PF	2004
117	3	11	H	HT	2008
117	20	102	H	HT	2008
117	25	14	H	HT	2008
117	27	28	H	HT	2008
118	6	23	H	HT-PF	2008
118	11	96	H	HT	2008
118	25	45	H	HT-PF	2008
119	11	42	H	HT	2008
119	16	20	H	HT-PF	2008
119	19	11	H	HT-PF	2008

Compt.	Stand	Acres	DFC	Year
51	8	44	H	2007
51	11	36	H	2007
51	20	93	H	2007
52	10	28	H	2007
52	13	21	H	2007
52	14	9	H	2007
52	16	91	H	2007
52	17	35	H	2007
52	23	23	H	2007
52	27	23	H	2007
52	36	22	H	2007
52	41	22	H	2007
52	42	18	H	2007
53	2	20	H	2007
53	11	87	H	2007
53	13	32	H	2007
54	12	25	H	2008
54	18	20	H	2008
54	20	21	H	2008
54	32	10	H	2008
55	1	14	H	2008
55	6	22	H	2008
55	15	33	H	2008
56	1	170	H	2008
56	5	19	H	2008
56	7	33	H	2008
56	23	152	H	2008
57	10	4	H	2008
58	3	28	H	2006
58	5	12	H	2006
58	8	5	H	2006
58	17	11	H	2006
58	21	4	H	2006
58	23	10	H	2006
58	26	81	H	2006
58	31	26	H	2006
59	15	31	H	2008
59	18	31	H	2008
64	7	285	H	2004
64	12	46	H	2004
65	7	23	H	2004
65	11	32	H	2004
65	13	70	H	2004
66	1	30	H	2007
66	7	110	H	2007
67	3	25	H	2007

Compt.	Stand	Acres	DFC	Treatment	Year
119	21	29	H	HT-PF	2008
134	1	14	H	HT	2008
136	15	58	H	HT	2008
136	19	13	H	HT	2008
137	16	26	H	HT	2008
137	18	43	H	HT	2008
138	1	49	H	HT	2008
138	11	48	H	HT	2008
Area 1 Total		4669	Hardwood		
Area 2 Restore					
8	5	5	S	DC-PF-PS	2008
8	7	11	S	DC-PF-PS	2008
8	13	1	S	DC-PF-PS	2008
8	14	8	S	DC-PF-PS	2008
8	22	43	S	DC-PF-PS	2008
8	23	141	S	DC-PF-PS	2008
8	32	54	S	DC-PF-PS	2008
20	5	22	S	DC-PF-PS	2005
20	9	13	S	DC-PF-PS	2005
20	11	3	S	DC-PF-PS	2005
20	27	24	S	DC-PF-PS	2005
21	1	12	S	DC-PF-PS	2004
21	3	96	S	DC-PF-PS	2004
21	4	44	S	DC-PF-PS	2004
21	5	15	S	DC-PF-PS	2004
21	11	41	S	DC-PF-PS	2004
31	14	72	S	DC-PF-PS	2007
32	1	17	S	DC-PF-PS	2006
32	4	47	S	DC-PF-PS	2006
32	6	19	S	DC-PF-PS	2006
32	8	23	S	DC-PF-PS	2006
33	14	11	S	DC-PF-PS	2005
48	1	21	S	DC-PF-PS	2007
48	3	12	S	DC-PF-PS	2007
121	5	35	S	DC-PF-PS	2007
121	18	14	S	DC-PF-PS	2007
124	2	32	S	DC-PF-PS	2006
124	3	16	S	DC-PF-PS	2006
124	4	15	S	DC-PF-PS	2006
124	5	35	S	DC-PF-PS	2006
124	8	41	S	DC-PF-PS	2006
124	11	19	S	DC-PF-PS	2006
124	16	188	S	DC-PF-PS	2006
124	20	49	S	DC-PF-PS	2006
125	15	29	S	DC-PF-PS	2008

Compt.	Stand	Acres	DFC	Year
67	18	15	H	2007
67	24	44	H	2007
68	1	39	H	2004
68	13	42	H	2004
69	4	49	H	2008
69	15	42	H	2008
69	20	44	H	2008
70	1	51	H	2008
70	18	44	H	2008
70	27	43	H	2008
76	27	4	H	2006
76	31	15	H	2006
76	36	22	H	2006
76	48	9	H	2006
76	49	39	H	2006
77	6	41	H	2004
78	2	8	H	2006
78	10	18	H	2006
78	14	136	H	2006
79	5	10	H	2005
79	15	20	H	2005
79	18	11	H	2005
80	2	45	H	2006
80	3	11	H	2006
80	12	37	H	2006
80	13	63	H	2006
80	16	37	H	2006
80	17	30	H	2006
81	17	22	H	2005
90	1	48	H	2008
90	2	11	H	2008
90	7	46	H	2008
90	10	28	H	2008
90	24	25	H	2008
90	34	11	H	2008
90	38	26	H	2008
91	2	67	H	2008
91	4	35	H	2008
91	5	26	H	2008
92	4	45	H	2004
92	9	28	H	2004
92	10	67	H	2004
92	28	76	H	2004
93	4	18	H	2006
93	9	25	H	2006
93	11	24	H	2006

Compt.	Stand	Acres	DFC	Treatment	Year
126	1	17	S	DC-PF-PS	2008
126	3	37	S	DC-PF-PS	2008
126	15	11	S	DC-PF-PS	2008
126	17	10	S	DC-PF-PS	2008
126	19	42	S	DC-PF-PS	2008
127	16	18	S	DC-PF-PS	2005
129	5	9	S	DC-PF-PS	2008
129	15	10	S	DC-PF-PS	2008
130	1	31	S	DC-PF-PS	2008
131	12	10	S	DC-PF-PS	2008
132	3	4	S	DC-PF-PS	2004
132	5	11	S	DC-PF-PS	2004
132	6	37	S	DC-PF-PS	2004
132	7	13	S	DC-PF-PS	2004
132	8	15	S	DC-PF-PS	2004
132	15	13	S	DC-PF-PS	2004
132	17	15	S	DC-PF-PS	2004
133	2	86	S	DC-PF-PS	2006
133	9	46	S	DC-PF-PS	2006
133	17	40	S	DC-PF-PS	2006
139	1	15	S	DC-PF-PS	2007
139	5	31	S	DC-PF-PS	2007
139	6	16	S	DC-PF-PS	2007
139	13	43	S	DC-PF-PS	2007
139	17	11	S	DC-PF-PS	2007
139	19	12	S	DC-PF-PS	2007
139	22	64	S	DC-PF-PS	2007
139	26	22	S	DC-PF-PS	2007
143	21	11	S	DC-PF-PS	2007
Area 2 Total		1928	Shortleaf		
Area 3 Restore					
148	15	11	L	DC-PF-PL	2005
148	20	36	L	DC-PF-PL	2005
148	22	9	L	DC-PF-PL	2005
148	37	14	L	DC-PF-PL	2005
149	4	5	L	DC-PF-PL	2008
149	5	16	L	DC-PF-PL	2008
149	6	9	L	DC-PF-PL	2008
149	8	10	L	DC-PF-PL	2008
149	10	13	L	DC-PF-PL	2008
149	19	39	L	DC-PF-PL	2008
150	2	5	L	DC-PF-PL	2007
150	4	26	L	DC-PF-PL	2007
150	7	60	L	DC-PF-PL	2007
150	8	3	L	DC-PF-PL	2007

Compt.	Stand	Acres	DFC	Year
93	21	38	H	2006
94	1	4	H	2005
94	7	32	H	2005
94	11	84	H	2005
95	2	38	H	2005
95	7	33	H	2005
95	12	18	H	2005
95	14	71	H	2005
95	16	101	H	2005
95	20	86	H	2005
95	24	29	H	2005
95	35	2	H	2005
101	1	5	H	2008
101	2	30	H	2008
101	7	164	H	2008
102	8	77	H	2007
102	10	62	H	2007
102	14	149	H	2007
102	18	14	H	2007
103	2	16	H	2007
103	17	12	H	2007
104	7	40	H	2008
104	9	46	H	2008
104	11	18	H	2008
105	1	25	H	2007
105	4	118	H	2007
107	2	49	H	2008
116	6	24	H	2005
116	8	80	H	2005
116	9	147	H	2005
116	10	54	H	2005
117	6	9	H	2007
117	7	20	H	2007
117	14	86	H	2007
118	2	23	H	2007
118	5	59	H	2007
118	6	104	H	2007
118	17	65	H	2007
118	19	27	H	2007
118	25	26	H	2007
119	5	20	H	2008
119	16	88	H	2008
136	7	9	H	2008
136	9	5	H	2008
136	13	42	H	2008
136	20	19	H	2008

Compt.	Stand	Acres	DFC	Treatment	Year
150	16	3	L	DC-PF-PL	2007
150	17	5	L	DC-PF-PL	2007
150	19	12	L	DC-PF-PL	2007
150	20	21	L	DC-PF-PL	2007
150	23	6	L	DC-PF-PL	2007
150	24	10	L	DC-PF-PL	2007
150	27	7	L	DC-PF-PL	2007
151	9	16	L	DC-PF-PL	2005
151	10	72	L	DC-PF-PL	2005
151	11	84	L	DC-PF-PL	2005
151	14	8	L	DC-PF-PL	2005
151	16	19	L	DC-PF-PL	2005
151	22	5	L	DC-PF-PL	2005
151	24	5	L	DC-PF-PL	2005
151	33	15	L	DC-PF-PL	2005
151	34	6	L	DC-PF-PL	2005
151	39	32	L	DC-PF-PL	2005
151	49	16	L	DC-PF-PL	2005
151	56	1	L	DC-PF-PL	2005
152	11	17	L	DC-PF-PL	2005
159	1	30	L	DC-PF-PL	2007
159	9	3	L	DC-PF-PL	2007
160	10	15	L	DC-PF-PL	2004
160	25	18	L	DC-PF-PL	2004
160	26	6	L	DC-PF-PL	2004
163	26	14	L	DC-PF-PL	2005
164	7	9	L	DC-PF-PL	2007
164	15	10	L	DC-PF-PL	2007
165	24	11	L	DC-PF-PL	2007
166	9	3	L	DC-PF-PL	2005
166	18	6	L	DC-PF-PL	2005
166	19	6	L	DC-PF-PL	2005
166	20	37	L	DC-PF-PL	2005
166	21	1	L	DC-PF-PL	2005
Area 3 Total		785	Longleaf		
Total Pine DFC		2713			
Total Hdwd DFC		4669			
Total Restore		7382			

Total Thin		11102	Hardwood	
Area 2 Thin				
Compt.	Stand	Acres	DFC	Year
8	4	30	S	2006
8	5	124	S	2006
8	7	24	S	2006
8	9	50	S	2006
8	12	44	S	2006
8	14	51	S	2006
8	23	59	S	2006
8	32	90	S	2006
19	3	24	S	2005
19	9	29	S	2005
20	4	19	S	2007
20	5	12	S	2007
20	8	19	S	2007
20	9	32	S	2007
20	11	47	S	2007
20	16	27	S	2007
20	18	7	S	2007
20	21	26	S	2007
20	22	32	S	2007
20	27	5	S	2007
21	18	41	S	2008
31	3	102	S	2005
31	4	33	S	2005
31	14	84	S	2005
31	19	55	S	2005
32	1	25	S	2004
32	3	19	S	2004
32	14	33	S	2004
32	15	31	S	2004
32	18	43	S	2004
33	3	44	S	2005
33	10	27	S	2005
33	19	63	S	2005
33	23	55	S	2005
34	3	33	S	2005
34	5	29	S	2005
34	14	37	S	2005
34	22	38	S	2005
121	6	14	S	2007
121	20	13	S	2007
122	2	36	S	2007
122	3	11	S	2007
122	16	25	S	2007

Compt.	Stand	Acres	DFC	Year
122	24	9	S	2007
122	27	20	S	2007
123	6	52	S	2008
124	16	158	S	2004
124	20	78	S	2004
124	21	16	S	2004
125	23	168	S	2006
125	31	91	S	2006
125	38	124	S	2006
125	59	12	S	2006
125	66	38	S	2006
126	5	41	S	2006
126	12	46	S	2006
126	15	88	S	2006
126	21	23	S	2006
126	23	71	S	2006
126	26	34	S	2006
126	30	19	S	2006
126	31	35	S	2006
126	40	88	S	2006
126	49	8	S	2006
127	13	35	S	2007
127	20	30	S	2007
127	21	66	S	2007
127	29	46	S	2007
128	3	32	S	2005
128	10	34	S	2005
128	12	57	S	2005
128	19	46	S	2005
128	33	110	S	2005
129	15	31	S	2007
129	26	53	S	2007
130	1	31	S	2006
130	7	29	S	2006
130	12	57	S	2006
130	14	53	S	2006
130	20	39	S	2006
131	12	27	S	2005
131	16	41	S	2005
132	3	12	S	2005
132	5	29	S	2005
132	10	43	S	2005
132	13	49	S	2005
132	17	15	S	2005
133	17	79	S	2007
139	2	38	S	2008

Compt.	Stand	Acres	DFC	Year
139	18	20	S	2008
139	21	17	S	2008
140	4	34	S	2008
140	9	31	S	2008
140	12	36	S	2008
141	20	53	S	2007
143	9	26	S	2008
143	11	51	S	2008
143	21	22	S	2008
Area 2 Total		4233	Shortleaf	
Area 3 Thin				
148	6	20	L	2004
148	10	69	L	2004
148	11	20	L	2004
148	12	19	L	2004
148	15	47	L	2004
148	17	70	L	2004
148	23	23	L	2004
148	25	12	L	2004
148	27	52	L	2004
148	28	37	L	2004
148	31	27	L	2004
149	6	26	L	2006
149	7	44	L	2006
150	2	23	L	2006
150	4	85	L	2006
150	7	3	L	2006
150	10	36	L	2006
151	21	32	L	2006
151	24	7	L	2006
151	29	10	L	2006
152	10	30	L	2008
152	25	43	L	2008
152	28	14	L	2008
153	15	10	L	2008
154	3	54	L	2008
154	7	55	L	2008
154	10	68	L	2008
154	11	39	L	2008
154	15	44	L	2008
154	19	30	L	2008
154	23	37	L	2008
157	10	32	L	2004
157	19	19	L	2008
157	22	18	L	2008

Year Column:
Planned Treatment Year

DFC Column:
H = Hardwood
S = Shortleaf
L = Longleaf

Compt.	Stand	Acres	DFC	Year
159	9	22	L	2004
160	10	68	L	2008
160	17	32	L	2008
160	24	54	L	2008
160	26	40	L	2008
160	30	24	L	2008
161	1	8	L	2006
161	2	14	L	2006
161	6	49	L	2006
161	9	101	L	2006
161	15	27	L	2006
161	16	29	L	2006
161	27	42	L	2006
163	20	38	L	2007
163	22	54	L	2007
163	26	32	L	2004
163	30	13	L	2004
163	31	78	L	2007
163	39	27	L	2004
164	4	46	L	2004
164	15	40	L	2004
164	17	83	L	2004
164	20	33	L	2004
164	28	12	L	2004
164	30	14	L	2004
165	20	24	L	2005
165	21	20	L	2005
165	24	49	L	2005
165	25	30	L	2005
166	4	12	L	2005
166	11	12	L	2005
166	23	37	L	2005
166	26	26	L	2005
166	30	144	L	2005
166	31	23	L	2005
166	32	6	L	2005
166	35	13	L	2005
170	29	20	L	2007
170	33	25	L	2007
170	36	23	L	2007
170	49	20	L	2007
171	3	22	L	2007
171	22	47	L	2007
171	25	4	L	2007
171	26	59	L	2007
171	32	18	L	2007

Treatment Column:

DC = Roller Drum Chop
HT = Hand tools
PF = Prescribed Fire
PS = Plant Shortleaf
PL = Plant Longleaf
NT = No Treatment

Compt.	Stand	Acres	DFC	Year
171	34	39	L	2007
Area 3 Total		2808	<i>Longleaf</i>	
<i>Total Pine DFC</i>		<i>7041</i>		
<i>Total Hdwd DFC</i>		<i>11102</i>		
Total Thin		18143		

Alternative 3, 5, and 6 Proposed Actions List

Compt.	Stand	Acres	DFC	Year
Area 1 Thin				
9	2	74	H	2008
9	5	13	H	2008
9	7	26	H	2008
10	6	75	H	2008
10	10	38	H	2008
10	11	9	H	2008
15	10	28	H	2004
15	11	45	H	2004
16	1	76	H	2004
16	5	25	H	2004
17	13	41	H	2004
18	4	56	H	2005
18	7	28	H	2005
18	11	33	H	2005
22	9	32	H	2008
22	19	30	H	2008
22	23	50	H	2008
22	27	40	H	2008
22	29	20	H	2008
23	15	121	H	2008
24	12	33	H	2008
30	2	28	H	2007
30	8	33	H	2007
30	14	36	H	2007
35	23	25	H	2005
36	14	32	H	2007
37	7	30	H	2007
37	10	33	H	2007
37	13	23	H	2007
38	3	34	H	2005
38	7	29	H	2005
38	11	19	H	2005
43	6	91	H	2005
43	20	50	H	2005
44	1	31	H	2007
44	13	15	H	2007

Compt.	Stand	Acres	DFC	Treatment	Year
Area 1 Restore					
5	18	16	H	HT	2005
5	30	11	H	HT	2005
6	13	11	H	HT	2005
7	10	55	H	HT	2005
9	5	76	H	HT-PF	2006
10	11	23	H	HT-PF	2006
10	15	32	H	HT-PF	2006
15	13	44	H	HT-PF	2006
15	24	41	H	HT-PF	2006
16	1	31	H	HT	2006
18	4	65	H	HT-PF	2007
18	17	10	H	HT-PF	2007
22	17	17	H	HT-PF	2005
22	26	33	H	HT-PF	2005
23	6	35	H	HT	2005
23	15	42	H	HT-PF	2005
24	1	13	H	HT-PF	2005
29	3	25	H	HT-PF	2006
36	8	67	H	HT	2005
36	10	32	H	HT	2005
36	14	21	H	HT	2005
37	2	17	H	HT-PF	2005
37	10	11	H	HT-PF	2005
37	13	13	H	HT-PF	2005
37	15	15	H	HT-PF	2005
37	16	23	H	HT-PF	2005
38	1	31	H	HT	2007
38	5	21	H	HT-PF	2007
38	7	46	H	HT-PF	2007
38	11	33	H	HT-PF	2007
39	27	27	H	HT	2007
39	29	17	H	HT	2007
39	31	25	H	HT	2007
39	32	22	H	HT	2007
42	12	16	H	HT	2007
42	22	12	H	HT	2007

Compt.	Stand	Acres	DFC	Year
45	13	41	H	2007
45	17	22	H	2007
47	11	45	H	2007
49	6	28	H	2007
50	6	43	H	2007
50	18	25	H	2007
51	3	14	H	2008
51	8	44	H	2008
51	20	93	H	2008
52	10	28	H	2007
52	13	21	H	2007
52	14	9	H	2007
52	16	91	H	2007
52	17	35	H	2007
52	23	23	H	2007
52	27	24	H	2007
52	36	22	H	2007
52	41	22	H	2007
52	42	18	H	2007
53	11	87	H	2007
53	13	32	H	2007
59	15	31	H	2008
59	18	31	H	2008
67	3	25	H	2007
68	13	42	H	2004
69	15	42	H	2008
69	20	44	H	2008
70	1	51	H	2008
76	31	15	H	2006
76	36	22	H	2006
76	48	9	H	2006
76	49	39	H	2006
78	14	136	H	2006
80	17	30	H	2006
90	1	48	H	2008
90	2	11	H	2008
90	7	46	H	2008
90	10	28	H	2008
90	24	25	H	2008
91	2	67	H	2008
91	4	35	H	2008
91	5	26	H	2008
92	10	67	H	2004
94	1	4	H	2005
94	7	32	H	2005
94	11	84	H	2005
95	2	38	H	2005
95	7	33	H	2005

Compt.	Stand	Acres	DFC	Treatment	Year
42	27	13	H	HT	2007
42	33	16	H	HT	2007
43	4	70	H	HT-PF	2007
43	6	55	H	HT-PF	2007
45	2	61	H	HT	2008
45	4	49	H	HT	2008
46	3	39	H	HT-PF	2006
46	6	14	H	HT-PF	2006
49	20	31	H	HT	2005
51	8	18	H	HT	2005
51	11	23	H	HT	2005
52	13	10	H	HT	2005
52	27	11	H	HT-PF	2005
53	5	56	H	HT	2008
53	11	29	H	HT	2008
53	13	13	H	HT	2008
54	10	32	H	HT	2008
55	6	19	H	HT	2008
55	9	20	H	HT	2008
55	12	19	H	HT	2008
55	14	15	H	HT	2008
55	15	74	H	HT	2008
57	9	29	H	HT	2008
57	11	95	H	HT	2008
57	14	56	H	HT	2008
59	4	69	H	HT	2008
59	13	13	H	HT	2008
59	14	54	H	HT	2008
60	1	37	H	HT	2008
60	6	129	H	HT	2008
65	1	23	H	HT	2008
65	3	13	H	HT	2008
65	4	31	H	HT	2008
65	12	20	H	HT	2008
65	13	41	H	HT	2008
65	16	13	H	HT	2008
65	19	18	H	HT	2008
66	2	10	H	HT-PF	2007
66	3	19	H	HT-PF	2007
66	7	73	H	HT-PF	2007
67	6	16	H	HT	2007
67	11	16	H	HT	2007
67	12	34	H	HT	2007
68	6	70	H	HT	2007
68	8	27	H	HT	2007
68	11	13	H	HT	2007
69	22	105	H	HT	2007
70	10	136	H	HT-PF	2005

Compt.	Stand	Acres	DFC	Year
95	12	18	H	2005
95	14	71	H	2005
95	20	86	H	2005
95	24	29	H	2005
95	35	2	H	2005
101	2	30	H	2008
101	7	164	H	2008
104	7	28	H	2008
116	6	24	H	2005
116	8	80	H	2005
117	6	9	H	2007
117	14	86	H	2007
118	5	59	H	2007
118	6	114	H	2007
119	5	20	H	2008
136	13	42	H	2008
Area 1 Total		4092	Hardwood	
Area 2 Thin				
8	7	24	H	2006
8	9	50	H	2006
8	12	44	S	2006
8	14	51	S	2006
8	23	58	S	2006
8	32	90	S	2006
19	3	24	S	2005
19	9	29	H	2005
20	4	19	H	2007
20	5	12	H	2007
20	8	19	H	2007
20	9	32	H	2007
20	11	47	H	2007
20	21	26	H	2007
20	22	32	H	2007
20	27	5	H	2007
21	18	41	S	2008
31	14	84	S	2005
31	19	55	S	2005
32	1	25	S	2004
32	3	18	S	2004
32	8	8	S	2004
32	14	33	S	2004
32	15	31	S	2004
32	18	43	S	2004
33	3	44	S	2005
33	10	27	S	2005
33	19	63	S	2005
33	23	55	S	2005

Compt.	Stand	Acres	DFC	Treatment	Year
70	15	43	H	HT-PF	2005
70	23	41	H	HT-PF	2005
70	28	19	H	HT-PF	2005
76	18	55	H	HT	2006
76	26	30	H	HT	2006
77	3	22	H	HT	2006
77	6	12	H	HT	2006
81	5	76	H	HT	2006
81	6	21	H	HT	2006
90	10	34	H	HT-PF	2006
90	16	24	H	HT	2006
90	19	21	H	HT-PF	2006
90	20	46	H	HT-PF	2006
90	24	18	H	HT-PF	2006
91	4	12	H	HT	2006
91	6	21	H	HT	2006
92	4	12	H	HT	2006
92	13	61	H	HT	2006
92	24	15	H	HT	2006
93	5	14	H	HT	2006
93	11	21	H	HT	2006
94	1	47	H	HT-PF	2007
94	2	19	H	HT-PF	2007
94	7	35	H	HT	2007
94	11	35	H	HT	2007
95	11	32	H	HT-PF	2007
96	11	11	H	HT	2006
104	7	18	H	HT	2006
116	3	20	H	HT-PF	2004
116	6	13	H	HT-PF	2004
117	3	11	H	HT	2006
117	20	102	H	HT	2006
118	6	23	H	HT-PF	2006
118	11	96	H	HT	2006
118	25	45	H	HT-PF	2006
119	11	42	H	HT	2006
119	16	20	H	HT-PF	2006
119	19	11	H	HT-PF	2006
119	21	29	H	HT-PF	2006
134	1	14	H	HT	2005
136	15	58	H	HT	2005
136	19	13	H	HT	2005
137	16	26	H	HT	2005
137	18	43	H	HT	2005
138	1	49	H	HT	2005
138	11	48	H	HT	2005
Area 1 Total		4354	<i>Hardwood</i>		

Compt.	Stand	Acres	DFC	Year
34	5	29	H	2005
34	14	37	S	2005
34	22	38	S	2005
121	20	13	H	2007
122	2	36	H	2007
122	3	11	H	2007
122	16	25	H	2007
122	24	9	H	2007
124	16	102	S	2004
124	20	78	S	2004
125	23	169	S	2006
125	31	91	S	2006
125	38	124	S	2006
126	5	41	S	2006
126	15	87	S	2006
126	21	23	S	2006
126	23	71	S	2006
126	26	34	H	2006
126	31	35	H	2006
126	40	88	S	2006
126	49	8	S	2006
127	21	66	S	2007
128	3	32	S	2005
128	10	34	S	2005
128	12	57	S	2005
128	19	46	H	2005
129	15	31	S	2007
129	26	53	S	2007
130	1	31	S	2006
130	7	29	S	2006
130	12	57	S	2006
130	14	53	S	2006
130	20	39	S	2006
131	12	27	S	2005
131	16	41	S	2005
132	3	12	H	2005
132	5	29	S	2005
132	10	43	S	2005
132	13	49	S	2005
132	17	15	H	2005
133	17	79	H	2007
139	2	38	H	2008
139	18	20	H	2008
139	21	17	H	2008
140	4	34	H	2008
140	9	31	H	2008
140	12	36	H	2008
141	20	53	H	2007

Compt.	Stand	Acres	DFC	Treatment	Year
Area 2 Restore					
8	5	5	S	DC-PF-PS	2008
8	7	11	H	HT	2005
8	13	1	S	DC-PF-PS	2008
8	14	8	S	DC-PF-PS	2008
8	22	43	H	HT-PF	2005
8	23	137	S	DC-PF-PS	2008
8	32	54	S	DC-PF-PS	2008
20	5	22	H	HT	2005
20	9	13	H	HT	2005
20	27	24	H	HT	2005
21	1	12	S	DC-PF-PS	2004
21	3	96	S	DC-PF-PS	2004
21	4	44	S	DC-PF-PS	2004
21	5	15	H	HT-PF	2005
21	11	41	S	DC-PF-PS	2004
32	1	17	S	DC-PF-PS	2006
32	4	47	S	DC-PF-PS	2006
32	6	19	S	DC-PF-PS	2006
32	8	15	S	DC-PF-PS	2006
33	14	11	H	HT-PF	2005
48	1	21	H	HT	2005
48	3	12	H	HT	2005
121	5	35	H	HT	2007
121	18	14	H	HT	2007
124	2	32	H	HT	2004
124	3	16	H	HT	2004
124	5	35	H	HT	2004
124	8	41	H	HT	2004
124	11	19	H	HT	2004
124	16	188	S	DC-PF-PS	2006
124	20	17	H	HT	2004
124	20	33	S	DC-PF-PS	2006
125	15	29	H	HT-PF	2005
126	1	17	H	HT	2005
126	3	37	H	HT	2005
126	15	11	S	DC-PF-PS	2008
126	17	10	H	HT-PF	2005
126	19	14	S	DC-PF-PS	2008
127	16	18	H	HT	2005
129	5	9	S	DC-PF-PS	2006
129	15	10	S	DC-PF-PS	2006
130	1	31	S	DC-PF-PS	2008
131	12	10	S	DC-PF-PS	2006
132	5	11	S	DC-PF-PS	2004
132	6	37	S	DC-PF-PS	2004
132	7	13	S	DC-PF-PS	2004
132	8	15	S	DC-PF-PS	2004

Compt.	Stand	Acres	DFC	Year
143	8	5	H	2008
143	9	26	H	2008
143	11	51	H	2008
143	21	22	H	2008
Area 2 Total		3394		
		2422	Shortleaf	
		972	Hardwood	
Area 3 Thin				
148	6(46)	34	H	2004
148	10	69	L	2004
148	15	47	H	2004
149	6	25	L	2006
149	7	44	L	2006
149	17	80	H	2006
149	18	33	L	2006
149	19	82	L	2006
150	2	23	H	2006
150	4	85	L	2006
150	7	3	H	2006
150	10	36	H	2006
151	21	32	H	2006
151	24	7	H	2006
151	29	10	H	2006
152	10	30	H	2008
152	25	43	H	2008
153	15	10	H	2008
154	19	30	H	2008
157	10	32	H	2004
157	19	19	H	2008
157	22	18	H	2008
159	9	22	L	2004
160	10	68	L	2008
160	17	32	L	2008
160	24	54	L	2008
160	26	40	L	2008
160	30	24	L	2008
161	1	8	L	2006
161	2	14	L	2006
161	6	49	L	2006
161	9	100	L	2006
163	20	38	H	2007
163	22	54	H	2007
163	26	32	H	2004
163	30	13	H	2004
163	39	27	H	2004
164	4	45	H	2004
164	20	33	H	2004

Compt.	Stand	Acres	DFC	Treatment	Year
132	15	13	S	DC-PF-PS	2004
132	17	15	H	HT	2005
133	2	86	S	DC-PF-PS	2006
133	9	46	S	DC-PF-PS	2006
133	17	40	H	HT	2004
139	1	15	H	HT	2007
139	5	31	H	HT	2007
139	6	16	H	HT	2007
139	13	43	H	HT	2007
139	17	11	H	HT	2007
139	19	12	H	HT	2007
139	22	64	H	HT	2007
139	26	22	H	HT	2007
143	21	11	H	HT	2007
Area 2 Total		1795			
		1023	Shortleaf		
		772	Hardwood		
Area 3 Restore					
148	15	11	H	HT	2006
148	20	36	H	HT	2006
148	22	9	H	HT	2006
148	37	14	H	HT	2006
149	4	5	L	DC-PF-PL	2005
149	5	16	L	DC-PF-PL	2005
149	8	10	H	HT-PF	2005
149	19	39	L	DC-PF-PL	2005
150	4	20	L	DC-PF-PL	2005
150	7	60	H	HT	2008
150	8	25	H	HT	2008
150	19	12	H	HT	2008
150	20	21	H	HT	2008
150	23	6	H	HT	2008
150	24	10	H	HT	2008
151	9	16	H	HT	2008
151	10	72	H	HT	2008
151	11	84	H	HT	2008
151	16	19	H	HT	2008
151	22	5	H	HT	2008
151	24	5	H	HT	2008
151	33	15	L	DC-PF-PL	2005
151	39	32	H	HT-PF	2008
151	49	11	L	DC-PF-PL	2005
151	56	1	H	HT	2008
152	11	17	H	HT	2005
159	1	7	H	HT-PF	2004
159	1	23	L	DC-PF-PL	2006
159	9	3	H	HT-PF	2004

Compt.	Stand	Acres	DFC	Year
165	20	24	L	2005
165	24	49	L	2005
165	25	30	L	2005
166	23	37	H	2005
166	30	144	L	2005
166	31	23	L	2005
166	32	6	L	2005
170	29	20	H	2007
170	33	25	H	2007
170	36	23	H	2007
170	49	20	H	2007
171	3	22	H	2007
171	26	59	H	2007
171	34	39	H	2007
Area 3 Total		1966		
		1025	Longleaf	
		941	Hardwood	
Pine DFC		3447		
Hardwood DFC		6005		
Total Thin		9452		

Compt.	Stand	Acres	DFC	Treatment	Year
160	10	15	L	DC-PF-PL	2004
160	25	18	L	DC-PF-PL	2004
160	26	6	L	DC-PF-PL	2004
163	26	14	H	HT	2006
164	15	10	H	HT	2007
166	19	6	H	HT	2004
166	20	37	H	HT	2004
166	21	1	H	HT	2004
Area 3 Total		711			
		168	Longleaf		
		543	Hardwood		
Pine DFC		1191			
Hardwood DFC		5669			
Total Restore		6860			

Treatment Column:

DC = Roller Drum Chop
HT = Handtools
PF = Prescribed Fire
PS = Plant Shortleaf
PL = Plant Longleaf
NT = No Treatment

DFC Column:

H = Hardwood
S = Shortleaf
L = Longleaf

Year Column:

Planned Treatment Year

Alternative 4 Proposed Actions List

Compt.	Stand	Acres	DFC	Year
Area 1 Thin				
9	2	74	H	2008
9	5	13	H	2008
9	7	26	H	2008
10	6	75	H	2008
10	10	38	H	2008
10	11	9	H	2008
15	10	28	H	2004
15	11	45	H	2004
16	1	76	H	2004
16	5	25	H	2004
17	13	41	H	2004
18	4	56	H	2005
18	7	28	H	2005
18	11	33	H	2005
22	9	32	H	2008

Compt.	Stand	Acres	DFC	Treatment	Year
Area 1 Restore					
5	18	16	H	HT-NT	2005
5	30	11	H	HT-NT	2005
6	13	11	H	HT-NT	2005
7	10	55	H	HT-NT	2005
9	5	76	H	HT-PF-NT	2006
10	11	23	H	HT-PF-NT	2006
10	15	32	H	HT-PF-NT	2006
15	13	44	H	HT-PF-NT	2006
15	24	41	H	HT-NT	2006
16	1	31	H	HT-NT	2006
18	4	65	H	HT-PF-NT	2007
18	17	10	H	HT-PF-NT	2007
22	17	17	H	HT-PF-NT	2005
22	26	33	H	HT-PF-NT	2005
23	6	35	H	HT-NT	2005

Compt.	Stand	Acres	DFC	Year
22	19	30	H	2008
22	23	50	H	2008
22	27	40	H	2008
22	29	20	H	2008
23	15	121	H	2008
24	12	33	H	2008
30	2	28	H	2007
30	8	33	H	2007
30	14	36	H	2007
35	23	25	H	2005
36	14	32	H	2007
37	7	30	H	2007
37	10	33	H	2007
37	13	23	H	2007
38	3	34	H	2005
38	7	29	H	2005
38	11	19	H	2005
43	6	91	H	2005
43	20	50	H	2005
44	1	31	H	2007
44	13	15	H	2007
45	13	41	H	2007
45	17	22	H	2007
47	11	45	H	2007
49	6	28	H	2007
50	6	43	H	2007
50	18	25	H	2007
51	3	14	H	2008
51	8	44	H	2008
51	20	93	H	2008
52	10	28	H	2007
52	13	21	H	2007
52	14	9	H	2007
52	16	91	H	2007
52	17	35	H	2007
52	23	23	H	2007
52	27	24	H	2007
52	36	22	H	2007
52	41	22	H	2007
52	42	18	H	2007
53	11	87	H	2007
53	13	32	H	2007
59	15	31	H	2008
59	18	31	H	2008
67	3	25	H	2007
68	13	42	H	2004
69	15	42	H	2008
69	20	44	H	2008

Compt.	Stand	Acres	DFC	Treatment	Year
23	15	42	H	HT-PF-NT	2005
24	1	13	H	HT-PF-NT	2005
29	3	25	H	HT-PF-NT	2008
36	8	67	H	HT-NT	2005
36	10	32	H	HT-NT	2005
36	14	21	H	HT-NT	2005
37	2	17	H	HT-PF-NT	2005
37	10	11	H	HT-PF-NT	2005
37	13	13	H	HT-PF-NT	2005
37	15	15	H	HT-PF-NT	2005
37	16	23	H	HT-PF-NT	2005
38	1	31	H	HT-NT	2007
38	5	21	H	HT-PF-NT	2007
38	7	46	H	HT-PF-NT	2007
38	11	33	H	HT-PF-NT	2007
39	27	27	H	HT-NT	2007
39	29	17	H	HT-NT	2007
39	31	25	H	HT-NT	2007
39	32	22	H	HT-NT	2007
42	12	16	H	HT-NT	2007
42	22	12	H	HT-NT	2007
42	27	13	H	HT-NT	2007
42	33	16	H	HT-NT	2007
43	4	70	H	HT-PF-NT	2007
43	6	55	H	HT-PF-NT	2007
45	2	61	H	HT-NT	2008
45	4	49	H	HT-NT	2008
46	3	39	H	HT-PF-NT	2006
46	6	14	H	HT-PF-NT	2006
49	20	31	H	HT-NT	2005
51	8	18	H	HT-NT	2005
51	11	23	H	HT-NT	2005
52	13	10	H	HT-NT	2005
52	27	11	H	HT-PF-NT	2005
53	5	56	H	HT-NT	2008
53	11	29	H	HT-NT	2008
53	13	13	H	HT-NT	2008
54	10	32	H	HT-NT	2008
55	6	19	H	HT-NT	2008
55	9	20	H	HT-NT	2008
55	12	19	H	HT-NT	2008
55	14	15	H	HT-NT	2008
55	15	74	H	HT-NT	2008
57	9	29	H	HT-NT	2008
57	11	95	H	HT-NT	2008
57	14	56	H	HT-NT	2008
59	4	69	H	HT-NT	2008
59	13	13	H	HT-NT	2008

Compt.	Stand	Acres	DFC	Year
70	1	51	H	2008
76	31	15	H	2006
76	36	22	H	2006
76	48	9	H	2006
76	49	39	H	2006
78	14	136	H	2006
80	17	30	H	2006
90	1	48	H	2008
90	2	11	H	2008
90	7	46	H	2008
90	10	28	H	2008
90	24	25	H	2008
91	2	67	H	2008
91	4	35	H	2008
91	5	26	H	2008
92	10	67	H	2004
94	1	4	H	2005
94	7	32	H	2005
94	11	84	H	2005
95	2	38	H	2005
95	7	33	H	2005
95	12	18	H	2005
95	14	71	H	2005
95	20	86	H	2005
95	24	29	H	2005
95	35	2	H	2005
101	2	30	H	2008
101	7	164	H	2008
104	7	28	H	2008
116	6	24	H	2005
116	8	80	H	2005
117	6	9	H	2007
117	14	86	H	2007
118	5	59	H	2007
119	5	20	H	2008
136	13	42	H	2008
Area 1 Total		3978	Hardwood	
Area 2 Thin				
8	7	24	H	2006
8	9	50	H	2006
8	12	44	H	2006
8	14	51	H	2006
8	23	58	H	2006
8	32	90	H	2006
19	3	24	H	2005
19	9	29	H	2005
20	4	19	H	2007

Compt.	Stand	Acres	DFC	Treatment	Year
59	14	54	H	HT-NT	2008
60	1	37	H	HT-NT	2008
60	6	129	H	HT-NT	2008
65	1	23	H	HT-NT	2008
65	3	13	H	HT-NT	2008
65	4	31	H	HT-NT	2008
65	12	20	H	HT-NT	2008
65	13	41	H	HT-NT	2008
65	16	13	H	HT-NT	2008
65	19	18	H	HT-NT	2008
66	2	10	H	HT-PF-NT	2007
66	3	19	H	HT-PF-NT	2007
66	7	73	H	HT-PF-NT	2007
67	6	16	H	HT-NT	2007
67	11	16	H	HT-NT	2007
67	12	34	H	HT-NT	2007
68	6	70	H	HT-NT	2007
68	8	27	H	HT-NT	2007
68	11	13	H	HT-NT	2007
69	22	105	H	HT-NT	2007
70	10	136	H	HT-PF-NT	2005
70	15	43	H	HT-PF-NT	2005
70	23	41	H	HT-PF-NT	2005
70	28	19	H	HT-PF-NT	2005
76	18	55	H	HT-NT	2005
76	26	30	H	HT-NT	2005
77	3	22	H	HT-NT	2005
77	6	12	H	HT-NT	2005
81	5	76	H	HT-NT	2005
81	6	21	H	HT-NT	2005
90	10	34	H	HT-PF-NT	2006
90	16	24	H	HT-NT	2006
90	19	21	H	HT-PF-NT	2006
90	20	46	H	HT-PF-NT	2006
90	24	18	H	HT-NT	2006
91	4	12	H	HT-NT	2006
91	6	21	H	HT-NT	2006
92	4	12	H	HT-NT	2006
92	13	61	H	HT-NT	2006
92	24	15	H	HT-NT	2006
93	5	14	H	HT-NT	2006
93	11	21	H	HT-NT	2006
94	1	47	H	HT-PF-NT	2007
94	2	19	H	HT-PF-NT	2007
94	7	35	H	HT-NT	2007
94	11	35	H	HT-NT	2007
95	11	32	H	HT-PF-NT	2007
96	11	11	H	HT-NT	2006

Compt.	Stand	Acres	DFC	Year
20	5	12	H	2007
20	8	19	H	2007
20	9	32	H	2007
20	11	47	H	2007
20	21	26	H	2007
20	22	32	H	2007
20	27	5	H	2007
31	14	84	H	2005
31	19	55	H	2005
32	1	25	H	2004
32	3	18	H	2004
32	8	8	H	2004
32	14	33	H	2004
32	15	31	H	2004
32	18	43	H	2004
33	3	44	H	2005
33	10	27	H	2005
34	5	29	H	2005
34	14	37	H	2005
34	22	38	H	2005
121	20	13	H	2007
122	2	36	H	2007
122	3	11	H	2007
122	16	25	H	2007
122	24	9	H	2007
124	20	78	H	2004
125	38	124	H	2006
126	5	41	H	2006
126	15	87	H	2006
126	21	23	H	2006
126	23	71	H	2006
126	26	34	H	2006
126	31	35	H	2006
126	49	8	H	2006
127	21	66	H	2007
128	3	32	H	2005
128	10	34	H	2005
128	12	57	H	2005
128	19	46	H	2005
129	15	31	H	2007
129	26	53	H	2007
130	1	31	H	2006
130	7	29	H	2006
130	12	57	H	2006
130	20	39	H	2006
131	12	27	H	2005
131	16	41	H	2005
132	3	12	H	2005

Compt.	Stand	Acres	DFC	Treatment	Year
104	7	18	H	HT-NT	2006
116	3	20	H	HT-PF-NT	2006
116	6	13	H	HT-PF-NT	2006
117	3	11	H	HT-NT	2006
117	20	102	H	HT-NT	2006
118	6	23	H	HT-PF-NT	2006
118	11	96	H	HT-NT	2006
118	25	45	H	HT-PF-NT	2006
119	11	42	H	HT-NT	2006
119	16	20	H	HT-PF-NT	2006
119	19	11	H	HT-PF-NT	2006
119	21	29	H	HT-PF-NT	2006
134	1	14	H	HT-NT	2005
136	15	58	H	HT-NT	2005
136	19	13	H	HT-NT	2005
137	16	26	H	HT-NT	2005
137	18	43	H	HT-NT	2005
138	1	49	H	HT-NT	2005
138	11	48	H	HT-NT	2005
Area 1 Total		4354	Hardwood		
Area 2 Restore					
8	5	5	H	HT-NT	2008
8	7	11	H	HT-NT	2008
8	13	1	H	HT-NT	2008
8	14	8	H	HT-NT	2008
8	22	43	H	HT-PF-NT	2008
8	23	137	H	HT-NT	2008
8	32	54	H	HT-NT	2008
20	5	22	H	HT-NT	2005
20	9	13	H	HT-NT	2005
20	27	24	H	HT-NT	2005
21	1	12	H	HT-NT	2004
21	3	96	H	HT-NT	2004
21	4	44	H	HT-NT	2004
21	5	15	H	HT-PF-NT	2004
21	11	41	H	HT-NT	2004
32	1	17	H	HT-NT	2006
32	4	47	H	HT-NT	2006
32	6	19	H	HT-NT	2006
32	8	15	H	HT-NT	2006
33	14	11	H	HT-PF-NT	2005
48	1	21	H	HT-NT	2005
48	3	12	H	HT-NT	2005
121	5	35	H	HT-NT	2007
121	18	14	H	HT-NT	2007
124	2	32	H	HT-NT	2004
124	3	16	H	HT-NT	2004

Compt.	Stand	Acres	DFC	Year
132	5	29	H	2005
132	10	43	H	2005
132	17	15	H	2005
133	17	79	H	2007
139	2	38	H	2008
139	18	20	H	2008
139	21	17	H	2008
140	4	34	H	2008
140	9	31	H	2008
140	12	36	H	2008
141	20	53	H	2007
143	8	5	H	2008
143	9	26	H	2008
143	11	51	H	2008
143	21	22	H	2008
Area 2 Total		2683	Hardwood	
Area 3 Thin				
148	6(46)	34	H	2004
148	10	69	L	2004
148	15	47	H	2004
149	6	25	L	2006
149	7	44	L	2006
149	17	80	H	2006
149	18	33	L	2006
149	19	82	L	2006
150	2	23	H	2006
150	4	85	L	2006
150	7	3	H	2006
150	10	36	H	2006
151	21	32	H	2006
151	24	7	H	2006
151	29	10	H	2006
152	10	30	H	2008
152	25	43	H	2008
153	15	10	H	2008
154	19	30	H	2008
157	10	32	H	2004
157	19	19	H	2008
157	22	18	H	2008
159	9	22	L	2004
160	10	68	L	2008
160	17	32	L	2008
160	24	54	L	2008
160	26	40	L	2008
160	30	24	L	2008
161	1	8	L	2006
161	2	14	L	2006

Compt.	Stand	Acres	DFC	Treatment	Year
124	5	35	H	HT-NT	2004
124	8	41	H	HT-NT	2004
124	11	19	H	HT-NT	2004
124	16	188	H	HT-NT	2004
124	20	17	H	HT-NT	2004
124	20	18	H	HT-NT	2004
124	20	15	H	HT-NT	2004
125	15	29	H	HT-PF-NT	2005
126	1	17	H	HT-NT	2005
126	3	37	H	HT-NT	2005
126	15	11	H	HT-NT	2005
126	17	10	H	HT-PF-NT	2005
126	19	14	H	HT-NT	2005
127	16	18	H	HT-NT	2005
129	5	9	H	HT-NT	2006
129	15	10	H	HT-NT	2006
130	1	31	H	HT-NT	2006
131	12	10	H	HT-NT	2006
132	5	11	H	HT-NT	2004
132	6	37	H	HT-NT	2004
132	7	13	H	HT-NT	2004
132	8	15	H	HT-NT	2004
132	15	13	H	HT-NT	2004
132	17	15	H	HT-NT	2004
133	2	86	H	HT-NT	2006
133	9	46	H	HT-NT	2006
133	17	40	H	HT-NT	2006
139	1	15	H	HT-NT	2007
139	5	31	H	HT-NT	2007
139	6	16	H	HT-NT	2007
139	13	43	H	HT-NT	2007
139	17	11	H	HT-NT	2007
139	19	12	H	HT-NT	2007
139	22	64	H	HT-NT	2007
139	26	22	H	HT-NT	2007
143	21	11	H	HT-NT	2007
Area 2 Total		1795	Hardwood		
Area 3 Restore					
148	15	11	H	HT-NT	2006
148	20	36	H	HT-NT	2006
148	22	9	H	HT-NT	2006
148	37	14	H	HT-NT	2006
149	4	5	L	DC-PF-PL	2008
149	5	16	L	DC-PF-PL	2008
149	8	10	H	HT-NT	2005
149	19	39	L	DC-PF-PL	2008
150	4	20	L	DC-PF-PL	2008

Compt.	Stand	Acres	DFC	Year
161	6	49	L	2006
161	9	100	L	2006
163	20	38	H	2007
163	22	54	H	2007
163	26	32	H	2004
163	30	13	H	2004
163	39	27	H	2004
164	4	45	H	2004
164	20	33	H	2004
165	20	24	L	2005
165	24	49	L	2005
165	25	30	L	2005
166	23	37	H	2005
166	30	144	L	2005
166	31	23	L	2005
166	32	6	L	2005
170	29	20	H	2007
170	33	25	H	2007
170	36	23	H	2007
170	49	20	H	2007
171	3	22	H	2007
171	26	59	H	2007
171	34	39	H	2007
Area 3 Total		1966		

<i>Longleaf DFC</i>	1025		
<i>Hdwd DFC</i>	941		
Pine DFC	1025		
Hdwd DFC	7602		
Total Thin	8627		

Treatment Column:

DC = Roller Drum Chop
HT = Handtools
PF = Prescribed Fire
PS = Plant Shortleaf
PL = Plant Longleaf
NT = No Treatment

Compt.	Stand	Acres	DFC	Treatment	Year
150	7	60	H	HT-NT	2007
150	8	25	H	HT-NT	2007
150	19	12	H	HT-NT	2007
150	20	21	H	HT-NT	2007
150	23	6	H	HT-NT	2007
150	24	10	H	HT-NT	2007
151	9	16	H	HT-NT	2008
151	10	72	H	HT-NT	2008
151	11	84	H	HT-NT	2008
151	16	19	H	HT-NT	2008
151	22	5	H	HT-NT	2008
151	24	5	H	HT-NT	2008
151	33	15	L	DC-PF-PL	2008
151	39	32	H	HT-NT	2008
151	49	11	L	DC-PF-PL	2008
151	56	1	H	HT-NT	2008
152	11	17	H	HT-NT	2005
159	1	7	H	HT-PF-NT	2004
159	1	23	L	DC-PF-PL	2006
159	9	3	H	HT-PF-NT	2004
160	10	15	L	DC-PF-PL	2004
160	25	18	L	DC-PF-PL	2004
160	26	6	L	DC-PF-PL	2004
163	26	14	H	HT-NT	2008
Area 3 Total		711			
		168	<i>Longleaf DFC</i>		
		543	<i>Hardwood DFC</i>		
Pine DFC		168			
Hdwd DFC		6692			
Total Restore		6860			

DFC Column:

H = Hardwood
S = Shortleaf
L = Longleaf

Year Column:

Planned Treatment Year

Tentative/Planned Schedule of Treatments for Alternative 2

ENTRY YEAR 2004											
Site Preparation for Hardwood			Site Preparation for Pine			Plant Pine			Thin		
Compt.	Stand	Acres	Compt.	Stand	Acres	Compt.	Stand	Acres	Compt.	Stand	Acres
65	1	23	21	1	12				1	19	19
65	3	13	21	3	96				6	4	35
65	4	31	21	4	24				15	3	39
65	12	20	21	4	20				15	5	37
65	13	41	21	5	15				15	6	18
65	16	13	21	11	41				15	8	25
65	19	18	132	3	4				15	10	28
66	2	10	132	5	11				15	11	45
66	3	19	132	6	37				16	1	76
66	7	63	132	7	13				16	5	25
66	7	10	132	8	15				17	6	54
67	6	16	132	15	13				17	13	41
67	11	16	132	17	15				32	1	25
67	11	45	160	10	15				32	3	19
67	12	34	160	25	18				32	14	33
68	6	70	160	26	6				32	15	31
68	8	27	Total Acres		355				32	18	43
68	9	55							64	7	285
68	9	25							64	12	46
68	11	13							65	7	23
69	22	105							65	11	32
116	3	20							65	13	70
116	6	13							68	1	39
116	7	15							68	13	42
Total Acres		715							77	6	41
									92	4	45
									92	9	28
									92	10	67
									92	28	76
									124	16	158
									124	20	78
									124	21	16
									148	6	20
									148	10	69
									148	11	20
									148	12	19
									148	15	47
									148	17	70
									148	23	23
									148	25	12

ENTRY YEAR 2004 (continued)											
Site Preparation for Hardwood			Site Preparation for Pine			Plant Pine			Thin		
Compt.	Stand	Acres	Compt.	Stand	Acres	Compt.	Stand	Acres	Compt.	Stand	Acres
									148	27	52
									148	28	37
									148	31	27
									157	10	32
									159	9	22
									163	26	32
									163	30	13
									163	39	27
									164	4	46
									164	15	40
									164	17	83
									164	20	33
									164	28	12
									164	30	14
									Total Acres	2389	

ENTRY YEAR 2005											
Site Preparation for Hardwood			Site Preparation for Pine			Plant Pine			Thin		
Compt.	Stand	Acres	Compt.	Stand	Acres	Compt.	Stand	Acres	Compt.	Stand	Acres
5	18	16	20	5	22	21	1	12	3	11	8
5	30	11	20	9	13	21	3	96	3	17	32
7	10	38	20	11	3	21	4	24	3	24	23
7	10	17	20	27	11	21	4	20	13	18	12
22	17	17	20	27	13	21	5	15	13	25	28
22	26	33	33	14	11	21	11	41	13	27	33
23	6	35	127	16	18	132	3	4	14	12	56
23	15	28	148	15	11	132	5	11	14	14	49
23	15	14	148	20	36	132	6	37	14	16	41
36	8	67	148	22	9	132	7	13	18	4	56
36	10	32	148	37	14	132	8	15	18	7	28
36	14	21	151	9	16	132	15	13	18	11	33
37	2	17	151	10	72	132	17	15	18	16	29
37	10	11	151	11	84	160	10	15	18	30	2
37	13	13	151	14	8	160	25	18	19	3	24
37	15	15	151	16	19	160	26	6	19	9	29
37	16	23	151	22	5	Total Acres		355	29	3	53
51	8	18	151	24	5				29	6	37
51	11	23	151	33	15				29	7	8
52	13	10	151	34	6				29	8	42

ENTRY YEAR 2005 (continued)											
Site Preparation for Hardwood			Site Preparation for Pine			Plant Pine			Thin		
Compt.	Stand	Acres	Compt.	Stand	Acres	Compt.	Stand	Acres	Compt.	Stand	Acres
52	27	11	151	39	32				29	11	76
60	1	37	151	49	11				31	3	102
60	6	129	151	49	5				31	4	33
70	10	136	151	56	1				31	14	84
70	15	43	152	11	17				31	19	55
70	23	41	163	26	14				33	3	44
70	28	19	166	9	3				33	10	27
76	18	55	166	18	6				33	19	63
76	25	11	166	19	6				33	23	55
76	26	30	166	20	7				34	3	33
Total Acres	971		166	20	24				34	5	29
			166	20	6				34	14	37
			166	21	1				34	22	38
			Total Acres	524					35	23	25
									38	3	34
									38	7	29
									38	11	19
									42	3	13
									42	9	5
									42	12	34
									42	15	2
									42	21	114
									42	22	51
									42	23	9
									42	25	26
									42	26	35
									42	27	1
									42	29	63
									43	6	91
									43	20	50
									43	24	40
									79	5	10
									79	15	20
									79	18	11
									81	17	22
									94	1	4
									94	7	32
									94	11	84
									95	2	38
									95	7	33
									95	12	18
									95	14	71
									95	16	101
									95	20	86

ENTRY YEAR 2005 (continued)											
Site Preparation for Hardwood			Site Preparation for Pine			Plant Pine			Thin		
Compt.	Stand	Acres	Compt.	Stand	Acres	Compt.	Stand	Acres	Compt.	Stand	Acres
									95	24	29
									95	35	2
									116	6	24
									116	8	80
									116	9	147
									116	10	54
									128	3	32
									128	10	34
									128	12	57
									128	19	46
									128	33	110
									131	12	27
									131	16	41
									132	3	12
									132	5	29
									132	10	43
									132	13	49
									132	17	15
									165	20	24
									165	21	20
									165	24	49
									165	25	30
									166	4	12
									166	11	12
									166	23	37
									166	26	26
									166	30	144
									166	31	23
									166	32	6
									166	35	13
									Total Acres	3697	

ENTRY YEAR 2006											
Site Preparation for Hardwood			Site Preparation for Pine			Plant Pine			Thin		
Compt.	Stand	Acres	Compt.	Stand	Acres	Compt.	Stand	Acres	Compt.	Stand	Acres
6	13	11	32	1	17	20	5	22	4	1	41
9	5	76	32	4	47	20	9	13	4	8	34
9	11	18	32	6	19	20	11	3	4	12	40
10	11	23	32	8	23	20	27	11	4	14	148
10	15	32	124	2	32	20	27	13	4	20	167
15	13	44	124	3	16	33	14	11	4	32	37
15	24	41	124	4	15	127	16	18	8	4	30
16	1	13	124	5	35	148	15	11	8	5	124
16	1	21	124	8	41	148	20	36	8	7	24
16	10	9	124	11	19	148	22	9	8	9	50
24	1	13	124	16	99	148	37	14	8	12	44
29	3	25	124	16	89	151	9	16	8	14	51
46	3	39	124	20	35	151	10	72	8	23	59
46	6	14	124	20	14	151	11	84	8	32	90
59	4	69	133	2	86	151	14	8	39	17	13
59	13	13	133	9	46	151	16	19	39	19	8
59	14	54	133	17	40	151	22	5	40	2	18
77	3	22	Total Acres		673	151	24	5	40	3	74
77	6	12				151	33	15	40	8	39
77	12	12				151	34	6	40	10	53
81	5	53				151	39	32	40	13	86
81	5	23				151	49	11	40	14	76
81	6	21				151	49	5	58	3	28
90	10	12				151	56	1	58	5	12
90	10	22				152	11	17	58	8	5
90	16	12				163	26	14	58	17	11
90	16	12				166	9	3	58	21	4
90	19	21				166	18	6	58	23	10
90	20	46				166	19	6	58	26	81
90	24	18				166	20	7	58	31	26
91	4	12				166	20	24	76	27	4
91	6	21				166	20	6	76	31	15
92	4	12				166	21	1	76	36	22
92	13	34				Total Acres		524	76	48	9
92	13	27							76	49	39
92	24	15							78	2	8
93	5	14							78	10	18
93	11	11							78	14	136
93	11	10							80	2	45
96	11	11							80	3	11
Total Acres		968							80	12	37
									80	13	63
									80	16	37

ENTRY YEAR 2006 (continued)											
Site Preparation for Hardwood			Site Preparation for Pine			Plant Pine			Thin		
Compt.	Stand	Acres	Compt	Stand	Acres	Compt	Stand	Acres	Compt	Stand	Acres
									80	17	30
									93	4	18
									93	9	25
									93	11	24
									93	21	38
									125	23	168
									125	31	91
									125	38	124
									125	59	12
									125	66	38
									126	5	41
									126	12	46
									126	15	88
									126	21	23
									126	23	71
									126	26	34
									126	30	19
									126	31	35
									126	40	88
									126	49	8
									130	1	31
									130	7	29
									130	12	57
									130	14	53
									130	20	39
									149	6	26
									149	7	44
									150	2	23
									150	4	85
									150	7	3
									150	10	36
									151	21	32
									151	24	7
									151	29	10
									161	1	8
									161	2	14
									161	6	49
									161	9	101
									161	15	27
									161	16	29
									161	27	42
									Total Acres	3693	

ENTRY YEAR 2007											
Site Preparation for Hardwood			Site Preparation for Pine			Plant Pine			Thin		
Compt.	Stand	Acres	Compt.	Stand	Acres	Compt.	Stand	Acres	Compt.	Stand	Acres
18	4	65	31	14	72	32	1	17	20	4	19
18	17	10	48	1	21	32	4	47	20	5	12
18	19	1	48	3	12	32	6	19	20	8	19
38	1	31	121	5	35	32	8	23	20	9	32
38	5	21	121	18	14	124	2	32	20	11	47
38	7	46	139	1	15	124	3	16	20	16	27
38	11	33	139	5	31	124	4	15	20	18	7
39	23	10	139	6	16	124	5	35	20	21	26
39	27	27	139	13	26	124	8	41	20	22	32
39	29	17	139	13	17	124	11	19	20	27	5
39	31	25	139	17	11	124	16	99	30	2	28
39	32	22	139	19	12	124	16	89	30	5	30
42	12	16	139	22	52	124	20	35	30	8	33
42	22	12	139	22	12	124	20	14	30	14	36
42	27	13	139	26	22	133	2	86	30	15	27
42	33	16	143	21	11	133	9	46	30	18	35
43	4	70	150	2	5	133	17	40	36	10	14
43	6	14	150	4	8	Total Acres 673			36	11	13
43	6	41	150	4	12				36	14	32
45	2	61	150	4	2				37	2	40
45	4	11	150	4	4				37	7	30
45	4	28	150	7	60				37	9	34
45	4	10	150	8	3				37	10	33
49	20	31	150	16	3				37	13	23
55	6	19	150	17	4				41	8	82
55	9	20	150	17	1				41	11	22
55	9	29	150	19	12				41	13	42
55	12	19	150	20	21				41	15	20
55	14	15	150	23	6				41	16	63
55	15	74	150	24	10				44	1	31
55	24	12	150	27	7				44	11	30
57	9	29	159	1	7				44	12	31
57	11	95	159	1	23				44	13	15
57	14	11	159	9	3				45	13	41
57	14	45	164	7	3				45	17	22
Total Acres		999	164	7	6				46	4	16
			164	15	10				46	7	83
			165	24	11				46	14	156
			Total Acres		600				47	11	45
									49	6	28
									50	2	24
									50	6	43

ENTRY YEAR 2007 (continued)											
Site Preparation for Hardwood			Site Preparation for Pine			Plant Pine			Thin		
Compt.	Stand	Acres	Compt.	Stand	Acres	Compt.	Stand	Acres	Compt.	Stand	Acres
									50	18	25
									50	26	22
									51	3	14
									51	8	44
									51	11	36
									51	20	93
									52	10	28
									52	13	21
									52	14	9
									52	16	91
									52	17	35
									52	23	23
									52	27	23
									52	36	22
									52	41	22
									52	42	18
									53	2	20
									53	11	87
									53	13	32
									66	1	30
									66	7	110
									67	3	25
									67	18	15
									67	24	44
									102	8	77
									102	10	62
									102	14	149
									102	18	14
									103	2	16
									103	17	12
									105	1	25
									105	4	118
									117	6	9
									117	7	20
									117	14	86
									118	2	23
									118	5	59
									118	6	104
									118	17	65
									118	19	27
									118	25	26
									121	6	14
									121	20	13
									122	2	36
									122	3	11

ENTRY YEAR 2007 (continued)											
Site Preparation for Hardwood			Site Preparation for Pine			Plant Pine			Thin		
Compt.	Stand	Acres	Compt.	Stand	Acres	Compt.	Stand	Acres	Compt.	Stand	Acres
									122	16	25
									122	24	9
									122	27	20
									127	13	35
									127	20	30
									127	21	66
									127	29	46
									129	15	31
									129	26	53
									133	17	79
									141	20	53
									163	20	38
									163	22	54
									163	31	78
									170	29	20
									170	33	25
									170	36	23
									170	49	20
									171	3	22
									171	22	47
									171	25	4
									171	26	59
									171	32	18
									171	34	39
									Total Acres		4177

ENTRY YEAR 2008											
Site Preparation for Hardwood			Site Preparation for Pine			Plant Pine			Thin		
Compt.	Stand	Acres	Compt.	Stand	Acres	Compt.	Stand	Acres	Compt.	Stand	Acres
53	5	56	8	5	5	31	14	72	5	1	89
53	11	29	8	7	11	48	1	21	5	5	23
53	13	13	8	13	1	48	3	12	5	9	56
54	1	9	8	14	2	121	5	35	5	16	52
54	10	32	8	14	6	121	18	14	5	23	44
94	1	47	8	22	43	139	1	15	5	29	19
94	2	19	8	23	2	139	5	31	5	30	4
94	7	35	8	23	2	139	6	16	5	32	15
94	11	23	8	23	137	139	13	26	7	2	30
94	11	12	8	32	54	139	13	17	7	10	93
95	11	32	125	15	29	139	17	11	7	11	33
95	11	19	126	1	17	139	19	12	9	2	74
104	7	18	126	3	37	139	22	52	9	5	13
117	3	11	126	15	11	139	22	12	9	7	26
117	20	15	126	17	10	139	26	22	9	11	37
117	20	87	126	19	28	143	21	11	9	14	23
117	25	14	126	19	14	150	2	5	9	16	58
117	27	28	129	5	2	150	4	8	10	2	54
118	6	23	129	5	7	150	4	12	10	6	75
118	11	96	129	15	10	150	4	2	10	10	38
118	25	45	130	1	31	150	4	4	10	11	9
119	11	42	131	12	10	150	7	60	10	14	47
119	16	20	149	4	5	150	8	3	10	18	75
119	19	11	149	5	16	150	16	3	21	18	41
119	21	29	149	6	9	150	17	4	22	9	32
134	1	14	149	8	10	150	17	1	22	19	30
136	15	58	149	10	13	150	19	12	22	23	50
136	19	13	149	19	39	150	20	21	22	27	40
137	16	26	Total Acres		561	150	23	6	22	29	20
137	18	43				150	24	10	23	1	25
138	1	49				150	27	7	23	2	8
138	11	48				159	1	7	23	5	25
Total Acres		1016				159	1	23	23	7	21
						159	9	3	23	15	121
						164	7	3	24	12	33
						164	7	6	24	20	8
						164	15	10	24	21	24
						165	24	11	54	12	25
						Total Acres		600	54	18	20
									54	20	21
									54	32	10
									55	1	14
									55	6	22

ENTRY YEAR 2008 (continued)											
Site Preparation for Hardwood			Site Preparation for Pine			Plant Pine			Thin		
Compt.	Stand	Acres	Compt.	Stand	Acres	Compt.	Stand	Acres	Compt.	Stand	Acres
									55	15	33
									56	1	170
									56	5	19
									56	7	33
									56	23	152
									57	10	4
									59	15	31
									59	18	31
									69	4	49
									69	15	42
									69	20	44
									70	1	51
									70	18	44
									70	27	43
									90	1	48
									90	2	11
									90	7	46
									90	10	28
									90	24	25
									90	34	11
									90	38	26
									91	2	67
									91	4	35
									91	5	26
									101	1	5
									101	2	30
									101	7	164
									104	7	40
									104	9	46
									104	11	18
									107	2	49
									119	5	20
									119	16	88
									123	6	52
									136	7	9
									136	9	5
									136	13	42
									136	20	19
									139	2	38
									139	18	20
									139	21	17
									140	4	34
									140	9	31
									140	12	36
									143	9	26

ENTRY YEAR 2008 (continued)											
Site Preparation for Hardwood			Site Preparation for Pine			Plant Pine			Thin		
Compt.	Stand	Acres	Compt.	Stand	Acres	Compt.	Stand	Acres	Compt.	Stand	Acres
									143	11	51
									143	21	22
									152	10	30
									152	25	43
									152	28	14
									153	15	10
									154	3	54
									154	7	55
									154	10	68
									154	11	39
									154	15	44
									154	19	30
									154	23	37
									157	19	19
									157	22	18
									160	10	68
									160	17	32
									160	24	54
									160	26	40
									160	30	24
									Total Acres	4187	

ENTRY YEAR 2009								
Site Preparation for Hardwood			Site Preparation for Pine			Plant Pine		
Compt.	Stand	Acres	Compt.	Stand	Acres	Compt.	Stand	Acres
						8	5	5
						8	7	11
						8	13	1
						8	14	2
						8	14	6
						8	22	43
						8	23	2
						8	23	2
						8	23	137
						8	32	54
						125	15	29
						126	1	17
						126	3	37
						126	15	11
						126	17	10
						126	19	28
						126	19	14
						129	5	2
						129	5	7
						129	15	10
						130	1	31
						131	12	10
						149	4	5
						149	5	16
						149	6	9
						149	8	10
						149	10	13
						149	19	39
						Total Acres		561

Tentative/Planned Schedule of Treatments for Alternative 3, 5, and 6

ENTRY YEAR 2004 - Alternatives 3, 5, 6											
Site Preparation for Hardwood			Site Preparation for Pine			Plant Pine			Thin		
Compt.	Stand	Acres	Compt.	Stand	Acres	Compt.	Stand	Acres	Compt.	Stand	Acres
116	3	20	21	1	12				15	10	28
116	6	13	21	3	96				15	11	45
124	2	32	21	4	24				16	1	10
124	3	16	21	4	20				16	1	66
124	5	35	21	11	41				16	5	25
124	8	41	132	5	11				17	13	41
124	11	19	132	6	37				32	1	25
124	20	17	132	7	13				32	3	18
133	17	40	132	8	15				32	8	8
159	1	7	132	15	13				32	14	33
159	9	3	160	10	15				32	15	31
166	19	6	160	25	18				32	18	43
166	20	37	160	26	6				68	13	42
166	21	1	Total Acres		321				92	10	67
Total Acres		287							124	16	102
									124	20	78
									148	10	69
									148	15	36
									148	15	11
									148	6(46)	34
									157	10	32
									159	9	22
									163	26	32
									163	30	13
									163	39	27
									164	4	45
									164	20	33
									Total Acres		1016

ENTRY YEAR 2005 - Alternatives 3, 5, 6											
Site Preparation for Hardwood			Site Preparation for Pine			Plant Pine			Thin		
Compt.	Stand	Acres	Compt.	Stand	Acres	Compt.	Stand	Acres	Compt.	Stand	Acres
5	18	16	149	4	5	21	1	12	18	4	45
5	30	11	149	5	16	21	3	96	18	4	11
6	13	11	149	19	39	21	4	24	18	7	28
7	10	55	150	4	8	21	4	20	18	11	33
8	7	11	150	4	12	21	11	41	19	3	24
8	22	43	151	33	15	132	5	11	19	9	29
20	5	22	151	49	11	132	6	37	31	14	78
20	9	13	Total Acres		106	132	7	13	31	14	6
20	27	24				132	8	15	31	19	55
21	5	15				132	15	13	33	3	44
22	17	17				160	10	15	33	10	27
22	26	33				160	25	18	33	19	63
23	6	35				160	26	6	33	23	55
23	15	42				Total Acres		321	34	5	29
24	1	13							34	14	37
33	14	11							34	22	38
36	8	67							35	23	25
36	10	32							38	3	34
36	14	21							38	7	29
37	2	17							38	11	19
37	10	11							43	6	91
37	13	13							43	20	50
37	15	15							94	1	4
37	16	23							94	7	32
48	1	21							94	11	84
48	3	12							95	2	38
49	20	31							95	7	33
51	8	18							95	12	18
51	11	23							95	14	71
52	13	10							95	20	86
52	27	11							95	24	29
70	10	136							95	35	2
70	15	43							116	6	24
70	23	41							116	8	79
70	28	19							116	8	1
125	15	29							128	3	32
126	1	17							128	10	34
126	3	37							128	12	57
126	17	10							128	19	46
127	16	18							131	12	27
132	17	15							131	16	41
134	1	14							132	3	12
136	15	58							132	5	29

ENTRY YEAR 2005 - Alternatives 3, 5, 6 (continued)											
Site Preparation for Hardwood			Site Preparation for Pine			Plant Pine			Thin		
Compt.	Stand	Acres	Compt.	Stand	Acres	Compt.	Stand	Acres	Compt.	Stand	Acres
136	19	13							132	10	43
137	16	26							132	13	49
137	18	43							132	17	15
138	1	49							165	20	24
138	11	48							165	24	49
149	8	10							165	25	30
152	11	17							166	23	37
Total Acres	1340								166	30	144
									166	31	23
									166	32	6
									Total Acres	2049	

ENTRY YEAR 2006 - Alternatives 3, 5, 6											
Site Preparation for Hardwood			Site Preparation for Pine			Plant Pine			Thin		
Compt.	Stand	Acres	Compt.	Stand	Acres	Compt.	Stand	Acres	Compt.	Stand	Acres
9	5	76	32	1	17	149	4	5	8	7	24
10	11	23	32	4	47	149	5	16	8	9	50
10	15	32	32	6	19	149	19	39	8	12	44
15	13	44	32	8	15	150	4	8	8	14	51
15	24	41	124	16	99	150	4	12	8	23	17
16	1	31	124	16	89	151	33	15	8	23	29
29	3	25	124	20	18	151	49	11	8	23	12
46	3	39	124	20	15	Total Acres	106		8	32	55
46	6	14	129	5	2				8	32	35
76	18	55	129	5	7				76	31	15
76	26	30	129	15	10				76	36	22
77	3	22	131	12	10				76	48	9
77	6	12	133	2	86				76	49	39
81	5	76	133	9	46				78	14	136
81	6	21	159	1	23				80	17	30
90	10	34	Total Acres	503					125	23	168
90	16	24							125	23	1
90	19	21							125	31	91
90	20	46							125	38	124
90	24	18							126	5	41
91	4	12							126	15	15
91	6	21							126	15	72
92	4	12							126	21	23
92	13	61							126	23	71
92	24	15							126	26	34
93	5	14							126	31	35
93	11	21							126	40	88

ENTRY YEAR 2006 - Alternatives 3, 5, 6 (continued)											
Site Preparation for Hardwood			Site Preparation for Pine			Plant Pine			Thin		
Compt.	Stand	Acres	Compt.	Stand	Acres	Compt.	Stand	Acres	Compt.	Stand	Acres
96	11	11							126	49	8
104	7	18							130	1	31
117	3	11							130	7	29
117	20	102							130	12	57
118	6	23							130	14	53
118	11	96							130	20	39
118	25	45							149	6	4
119	11	42							149	6	21
119	16	20							149	7	44
119	19	11							149	17	80
119	21	29							149	18	33
148	15	11							149	19	82
148	20	36							150	2	23
148	22	9							150	4	44
148	37	14							150	4	41
163	26	14							150	7	3
Total Acres	1332								150	10	36
									151	21	32
									151	24	7
									151	29	10
									161	1	8
									161	2	14
									161	6	49
									161	9	100
									Total Acres	2179	

ENTRY YEAR 2007 - Alternatives 3, 5, 6											
Site Preparation for Hardwood			Site Preparation for Pine			Plant Pine			Thin		
Compt.	Stand	Acres	Compt.	Stand	Acres	Compt.	Stand	Acres	Compt.	Stand	Acres
18	4	65				32	1	17	20	4	19
18	17	10				32	4	47	20	5	4
38	1	31				32	6	19	20	5	8
38	5	21				32	8	15	20	8	19
38	7	46				124	16	99	20	9	32
38	11	33				124	16	89	20	11	47
39	27	27				124	20	18	20	21	26
39	29	17				124	20	15	20	22	32
39	31	25				129	5	2	20	27	5
39	32	22				129	5	7	30	2	28
42	12	16				129	15	10	30	8	33
42	22	12				131	12	10	30	14	36

ENTRY YEAR 2007 - Alternatives 3, 5, 6											
Site Preparation for Hardwood			Site Preparation for Pine			Plant Pine			Thin		
Compt.	Stand	Acres	Compt.	Stand	Acres	Compt.	Stand	Acres	Compt.	Stand	Acres
42	27	13				133	2	86	36	14	32
42	33	16				133	9	46	37	7	30
43	4	70				159	1	23	37	10	33
43	6	55				Total Acres		503	37	13	19
66	2	10							37	13	4
66	3	19							44	1	31
66	7	73							44	13	15
67	6	16							45	13	41
67	11	16							45	17	22
67	12	34							47	11	45
68	6	70							49	6	28
68	8	27							50	6	43
68	11	13							50	18	25
69	22	105							52	10	28
94	1	47							52	13	21
94	2	19							52	14	9
94	7	35							52	16	91
94	11	35							52	17	35
95	11	32							52	23	23
121	5	35							52	27	7
121	18	14							52	27	17
139	1	15							52	36	22
139	5	31							52	41	22
139	6	16							52	42	18
139	13	43							53	11	87
139	17	11							53	13	32
139	19	12							67	3	25
139	22	64							117	6	9
139	26	22							117	14	86
143	21	11							118	5	57
164	15	10							118	5	2
Total Acres	1314								118	6	114
									121	20	13
									122	2	36
									122	3	11
									122	16	25
									122	24	9
									127	21	66
									129	15	31
									129	26	53
									133	17	79
									141	20	53
									163	20	38
									163	22	54

ENTRY YEAR 2007 - Alternatives 3, 5, 6 (continued)											
Site Preparation for Hardwood			Site Preparation for Pine			Plant Pine			Thin		
Compt.	Stand	Acres	Compt.	Stand	Acres	Compt.	Stand	Acres	Compt.	Stand	Acres
									170	29	20
									170	33	25
									170	36	23
									170	49	20
									171	3	22
									171	26	59
									171	34	39
									Total Acres	2038	

ENTRY YEAR 2008 - Alternatives 3, 5, 6											
Site Preparation for Hardwood			Site Preparation for Pine			Plant Pine			Thin		
Compt.	Stand	Acres	Compt.	Stand	Acres	Compt.	Stand	Acres	Compt.	Stand	Acres
45	2	61	8	5	5				9	2	74
45	4	49	8	13	1				9	5	13
53	5	56	8	14	2				9	7	26
53	11	29	8	14	6				10	6	75
53	13	13	8	23	137				10	10	38
54	10	32	8	32	54				10	11	9
55	6	19	126	15	11				21	18	41
55	9	20	126	19	14				22	9	32
55	12	19	130	1	31				22	19	30
55	14	15	Total Acres	261					22	23	50
55	15	74							22	27	40
57	9	29							22	29	20
57	11	95							23	15	4
57	14	56							23	15	117
59	4	69							24	12	33
59	13	13							51	3	14
59	14	54							51	8	44
60	1	37							51	20	93
60	6	129							59	15	31
65	1	23							59	18	31
65	3	13							69	15	42
65	4	31							69	20	44
65	12	20							70	1	51
65	13	41							90	1	48
65	16	13							90	2	11
65	19	18							90	7	46
150	7	60							90	10	28
150	8	25							90	24	25
150	19	12							91	2	67

ENTRY YEAR 2008 - Alternatives 3, 5, 6 (continued)											
Site Preparation for Hardwood			Site Preparation for Pine			Plant Pine			Thin		
Compt.	Stand	Acres	Compt.	Stand	Acres	Compt.	Stand	Acres	Compt.	Stand	Acres
150	20	21							91	4	35
150	23	6							91	5	26
150	24	10							101	2	30
151	9	16							101	7	164
151	10	72							104	7	28
151	11	84							119	5	20
151	16	19							136	13	42
151	22	5							139	2	38
151	24	5							139	18	20
151	39	32							139	21	17
151	56	1							140	4	34
Total Acres		1396							140	9	31
									140	12	36
									143	8	5
									143	9	26
									143	11	51
									143	21	22
									152	10	30
									152	25	43
									153	15	10
									154	19	30
									157	19	19
									157	22	18
									160	10	68
									160	17	32
									160	24	54
									160	26	22
									160	26	18
									160	30	24
									Total Acres		2170

ENTRY YEAR 2009 - Alternatives 3, 5, 6								
Site Preparation for Hardwood			Site Preparation for Pine			Plant Pine		
Compt.	Stand	Acres	Compt.	Stand	Acres	Compt.	Stand	Acres
						8	5	5
						8	13	1
						8	14	2
						8	14	6
						8	23	137
						8	32	54
						126	15	11
						126	19	14
						130	1	31
						Total Acres		261

Tentative/Planned Schedule of Treatments for Alternative 4

ENTRY YEAR 2004 – Alternative 4											
Site Preparation for Hardwood			Site Preparation for Pine			Plant Pine			Thin		
Compt.	Stand	Acres	Compt.	Stand	Acres	Compt.	Stand	Acres	Compt.	Stand	Acres
21	1	12	160	10	15				15	10	28
21	3	96	160	25	18				15	11	45
21	4	24	160	26	6				16	1	10
21	4	20	Total Acres		39				16	1	66
21	5	7							16	5	25
21	5	8							17	13	41
21	11	41							32	1	25
124	2	32							32	3	18
124	3	16							32	8	8
124	5	35							32	14	33
124	8	41							32	15	31
124	11	19							32	18	43
124	16	99							68	13	42
124	16	89							92	10	67
124	20	17							124	20	78
124	20	18							148	10	69
124	20	15							148	15	36
132	5	11							148	15	11
132	6	37							148	6(46)	34
132	7	13							157	10	32
132	8	15							159	9	22
132	15	13							163	26	32
132	17	15							163	30	13
159	1	7							163	39	27
159	9	3							164	4	45
164	15	10							164	20	33
166	19	6							Total Acres		914
166	20	7									
166	20	6									
166	20	24									
166	21	1									
Total Acres		757									

ENTRY YEAR 2005 - Alternative 4											
Site Preparation for Hardwood			Site Preparation for Pine			Plant Pine			Thin		
Compt.	Stand	Acres	Compt.	Stand	Acres	Compt.	Stand	Acres	Compt.	Stand	Acres
5	18	16				160	10	15	18	4	45
5	30	11				160	25	18	18	4	11
6	13	11				160	26	6	18	7	28
7	10	38				Total Acres		39	18	11	33
7	10	17							19	3	24
20	5	22							19	9	29
20	9	13							31	14	78
20	27	11							31	14	6
20	27	13							31	19	55
22	17	17							33	3	44
22	26	33							33	10	27
23	6	35							34	5	29
23	15	28							34	14	37
23	15	14							34	22	38
24	1	13							35	23	25
33	14	11							38	3	34
36	8	67							38	7	29
36	10	32							38	11	19
36	14	21							43	6	91
37	2	17							43	20	50
37	10	11							94	1	4
37	13	13							94	7	32
37	15	15							94	11	84
37	16	23							95	2	38
48	1	21							95	7	33
48	3	12							95	12	18
49	20	31							95	14	71
51	8	18							95	20	86
51	11	23							95	24	29
52	13	10							95	35	2
52	27	11							116	6	24
70	10	136							116	8	79
70	15	43							116	8	1
70	23	41							128	3	32
70	28	19							128	10	34
76	18	55							128	12	57
76	26	30							128	19	46
77	3	22							131	12	27
77	6	12							131	16	41
81	5	53							132	3	12
81	5	23							132	5	29
81	6	21							132	10	43
125	15	29							132	17	15

ENTRY YEAR 2005 – Alternative 4 (continued)											
Site Preparation for Hardwood			Site Preparation for Pine			Plant Pine			Thin		
Compt.	Stand	Acres	Compt.	Stand	Acres	Compt.	Stand	Acres	Compt.	Stand	Acres
126	1	17							165	20	24
126	3	37							165	24	49
126	15	11							165	25	30
126	17	10							166	23	37
126	19	14							166	30	144
127	16	18							166	31	23
134	1	14							166	32	6
136	15	58							Total Acres		1882
136	19	13									
137	16	26									
137	18	43									
138	1	49									
138	11	48									
149	8	10									
152	11	17									
Total Acres		1497									

ENTRY YEAR 2006 – Alternative 4											
Site Preparation for Hardwood			Site Preparation for Pine			Plant Pine			Thin		
Compt.	Stand	Acres	Compt.	Stand	Acres	Compt.	Stand	Acres	Compt.	Stand	Acres
9	5	76	159	1	23				8	7	24
10	11	23	Total Acres		23				8	9	50
10	15	32							8	12	44
15	13	44							8	14	51
15	24	41							8	23	17
16	1	10							8	23	29
16	1	21							8	23	12
32	1	17							8	32	55
32	4	47							8	32	35
32	6	19							76	31	15
32	8	15							76	36	22
46	3	39							76	48	9
46	6	14							76	49	39
90	10	12							78	14	136
90	10	22							80	17	30
90	16	12							125	38	124
90	16	12							126	5	41
90	19	21							126	15	15
90	20	46							126	15	72
90	24	18							126	21	23

ENTRY YEAR 2006 – Alternative 4 (continued)											
Site Preparation for Hardwood			Site Preparation for Pine			Plant Pine			Thin		
Compt.	Stand	Acres	Compt.	Stand	Acres	Compt.	Stand	Acres	Compt.	Stand	Acres
91	4	12							126	23	71
91	6	21							126	26	34
92	4	12							126	31	35
92	13	34							126	49	8
92	13	27							130	1	31
92	24	15							130	7	29
93	5	14							130	12	57
93	11	11							130	20	39
93	11	10							149	6	4
96	11	11							149	6	21
104	7	18							149	7	44
116	3	20							149	17	80
116	6	13							149	18	33
117	3	11							149	19	82
117	20	15							150	2	23
117	20	87							150	4	44
118	6	23							150	4	41
118	11	96							150	7	3
118	25	45							150	10	36
119	11	42							151	21	32
119	16	20							151	24	7
119	19	11							151	29	10
119	21	29							161	1	8
129	5	2							161	2	14
129	5	7							161	6	49
129	15	10							161	9	100
130	1	31							Total Acres		1778
131	12	10									
133	2	86									
133	9	46									
133	17	40									
148	15	11									
148	20	36									
148	22	9									
148	37	14									
Total Acres		1440									

ENTRY YEAR 2007 – Alternative 4											
Site Preparation for Hardwood			Site Preparation for Pine			Plant Pine			Thin		
Compt.	Stand	Acres	Compt.	Stand	Acres	Compt.	Stand	Acres	Compt.	Stand	Acres
18	4	65				159	1	23	20	4	19
18	17	10				Total Acres		23	20	5	4
38	1	31							20	5	8
38	5	21							20	8	19
38	7	46							20	9	32
38	11	33							20	11	47
39	27	27							20	21	26
39	29	17							20	22	32
39	31	25							20	27	5
39	32	22							30	2	28
42	12	16							30	8	33
42	22	12							30	14	36
42	27	13							36	14	32
42	33	16							37	7	30
43	4	70							37	10	33
43	6	14							37	13	19
43	6	41							37	13	4
66	2	10							44	1	31
66	3	19							44	13	15
66	7	63							45	13	41
66	7	10							45	17	22
67	6	16							47	11	45
67	11	16							49	6	28
67	12	34							50	6	43
68	6	70							50	18	25
68	8	27							52	10	28
68	11	13							52	13	21
69	22	105							52	14	9
94	1	47							52	16	91
94	2	19							52	17	35
94	7	35							52	23	23
94	11	23							52	27	7
94	11	12							52	27	17
95	11	32							52	36	22
121	5	35							52	41	22
121	18	14							52	42	18
139	1	15							53	11	87
139	5	31							53	13	32
139	6	16							67	3	25
139	13	26							117	6	9
139	13	17							117	14	86
139	17	11							118	5	57
139	19	12							118	5	2
139	22	52							121	20	13

ENTRY YEAR 2007 – Alternative 4 (continued)											
Site Preparation for Hardwood			Site Preparation for Pine			Plant Pine			Thin		
Compt.	Stand	Acres	Compt.	Stand	Acres	Compt.	Stand	Acres	Compt.	Stand	Acres
139	22	12							122	2	36
139	26	22							122	3	11
143	21	11							122	16	25
150	7	60							122	24	9
150	8	3							127	21	66
150	8	22							129	15	31
150	19	12							129	26	53
150	20	21							133	17	79
150	23	6							141	20	53
150	24	10							163	20	38
Total Acres		1438							163	22	54
									170	29	20
									170	33	25
									170	36	23
									170	49	20
									171	3	22
									171	26	59
									171	34	39
									Total Acres		1924

ENTRY YEAR 2008 – Alternative 4											
Site Preparation for Hardwood			Site Preparation for Pine			Plant Pine			Thin		
Compt.	Stand	Acres	Compt.	Stand	Acres	Compt.	Stand	Acres	Compt.	Stand	Acres
8	5	5	149	4	5				9	2	74
8	7	11	149	5	16				9	5	13
8	13	1	149	19	39				9	7	26
8	14	2	150	4	8				10	6	75
8	14	6	150	4	12				10	10	38
8	22	43	151	33	15				10	11	9
8	23	137	151	49	11				22	9	32
8	32	54	Total Acres		106				22	19	30
29	3	25							22	23	50
45	2	61							22	27	40
45	4	11							22	29	20
45	4	28							23	15	4
45	4	10							23	15	117
53	5	56							24	12	33
53	11	29							51	3	14
53	13	13							51	8	44
54	10	32							51	20	93
55	6	19							59	15	31
55	9	20							59	18	31

ENTRY YEAR 2008 – Alternative 4 (continued)											
Site Preparation for Hardwood			Site Preparation for Pine			Plant Pine			Thin		
Compt.	Stand	Acres	Compt.	Stand	Acres	Compt.	Stand	Acres	Compt.	Stand	Acres
55	12	19							69	15	42
55	14	15							69	20	44
55	15	74							70	1	51
57	9	29							90	1	48
57	11	95							90	2	11
57	14	11							90	7	46
57	14	45							90	10	28
59	4	69							90	24	25
59	13	13							91	2	67
59	14	54							91	4	35
60	1	37							91	5	26
60	6	129							101	2	30
65	1	23							101	7	164
65	3	13							104	7	28
65	4	31							119	5	20
65	12	20							136	13	42
65	13	41							139	2	38
65	16	13							139	18	20
65	19	18							139	21	17
151	9	16							140	4	34
151	10	72							140	9	31
151	11	84							140	12	36
151	16	19							143	8	5
151	22	5							143	9	26
151	24	5							143	11	51
151	39	32							143	21	22
151	56	1							152	10	30
163	26	14							152	25	43
Total Acres		1560							153	15	10
									154	19	30
									157	19	19
									157	22	18
									160	10	68
									160	17	32
									160	24	54
									160	26	22
									160	26	18
									160	30	24
									Total Acres		2129

ENTRY YEAR 2009 – Alternative 4								
Site Preparation for Hardwood			Site Preparation for Pine			Plant Pine		
Compt.	Stand	Acres	Compt.	Stand	Acres	Compt.	Stand	Acres
						149	4	5
						149	5	16
						149	19	39
						150	4	8
						150	4	12
						151	33	15
						151	49	11
						Total Acres		106

Recreation Resources of the Bankhead National Forest

Clear Creek Recreation Area

This area is highly developed and located on Smith Lake at the southern end of the forest. It offers 102 campsites with electricity, water, tables, grills, lantern posts, tent gravel, paved sites for trailers or recreation vehicles, spacious bath houses with warm showers, a playground, camper boat launch and paved bicycle trail. There are also 2 group camping areas where families can bring tents and find some privacy away from the remaining camp loops. The Day Use Area offers a swimming area with depth markers and a sand beach, 55 picnic tables, a 2.5 mile hiking trail (Raven Trail), a paved bicycle trail along the lake shore, bank fishing opportunities, drinking fountains and bath houses with cool showers. There are also three group shelters ideal for birthdays, reunions and meetings; these can be reserved. Permits, information and assistance are available at the entrance station (205 384-4792) and at the host sites located in each camping loop. The entire recreation area is managed under a special use permit to the Cradle of Forestry In America Interpretive Association with oversight by the USDA Forest Service.

Corinth Recreation Area

This area is the newest and most highly developed recreation area on the forest. It is located on Smith Lake just east of Double Springs. It offers 52 campsites with full hookups - electricity, water, sewage, tables, grills, lantern posts, paved sites for trailers or recreation vehicles, spacious bath houses with warm showers, a play area, camper boat launch and overflow parking. There are also 8 tent camping areas that were renovated from the old Corinth Campground; unique rock walls from the old days were incorporated into these sites. The Day Use Area offers a swimming area with depth markers and a sand beach, and 29 picnic tables scattered through the pine and hardwood forest overlooking the lake. There are bank fishing opportunities, drinking fountains and a bath house with cool showers at the beach. In addition, there is a group shelter (100 person capacity) ideal for birthdays, reunions and meetings; it can be reserved. Permits, information and assistance are available at the entrance station (205 489-3165) and at the host sites located in each camping loop. The entire recreation area is managed under a special use permit to the Cradle of Forestry In America Interpretive Association with oversight by the USDA Forest Service.

Houston Recreation Area

This developed recreation area is located on Smith Lake east of Double Springs. The campground has three loops that with 88 campsites in a rustic setting. The shady sites are great for tent camping. Each site has a grill, lantern post, table and tent gravel. Drinking water hydrants are scattered throughout the loops and bath houses provide warm showers. A 2.8 mile hiking trail connects the three camping loops with the day use area. The Day Use Area has a swimming area with depth markers and a sand beach and 14 picnic tables. Visitors can also launch a boat the ramp to Smith Lake or enjoy bank fishing opportunities. There is a group shelter ideal for birthdays, reunions and meetings; it can be reserved. Permits, information and assistance are available at the self service information boards, the Ranger District Office in Double Springs (205 489-5111) and at the host site located in the Fox Run camping loop.

Brushy Lake Recreation Area

This developed recreation area is located in the center of the Bankhead National Forest, near the Pinetorch Community. The campground has 13 campsites in a rustic setting adjacent to a 33 acre lake. The shady sites are great for tent camping. Each site has a grill, lantern post, table and tent gravel. Drinking water is available during the spring, summer and fall. There are two toilet facilities, one serving the campground year round (a non-flushing SST "sweet smelling toilet") and one serving the day use area – it provides showers except when closed in the winter season.

The Day Use Area has 20 picnic sites and a paved trail along the lake – with fishing areas and an accessible pier. There is also a boat ramp for non-motorized boats and canoes. Permits, information and assistance are available at the self service information boards and at the Ranger District Office in Double Springs (205 489-5111).

Flint Creek Multiple Use Trails

There are two loops providing opportunity for 16.5 miles of trail use. Trails are open for all terrain vehicles (commonly called 4 wheelers), motorcycles, mountain bikes, horses and hikers. At the self service trailhead, you can find permits, information, ample parking and a toilet.

Hunting

The general forest area of the Bankhead is used by hunters pursuing turkey, deer, squirrels, rabbits, quail, raccoons and wild hogs. State regulations control seasons, bag limits and methods. Hunters use archery, firearms, primitive firearms and dogs in various seasons. Management of vegetation is the primary tool for improving hunting opportunities.

Black Warrior Wildlife Management Area

This area (WMA), located in the heart of the Bankhead National Forest, is a favorite with hunters. It is 97,642 acres managed cooperatively by the USDA Forest Service and the Alabama Department of Wildlife and Fisheries Resources. The Sipsey Wilderness (25,002 acres) lies within the SMA. Management includes wildlife population surveys, wildlife habitat improvement including food openings, and collecting data on harvested animals. Regulations governing hunting are different from the remainder of the national forest and counties. The primary species hunted are the white-tailed deer and eastern wild turkey. In the 2002-2003 season, 4411 hunter days were registered for the deer hunts and 130 deer were harvested. Fifty-one (51) turkeys were harvested with 672 hunter days recorded for the 2003 spring season.

Owl Creek Non-Motorized Trails

There are three inter-connected loops that provide 24.9 miles of non-motorized trail use in the central part of the Bankhead National Forest. These trails are open to hikers, horse riders and mountain bikers. These trails are reached through the Owl Creek Horse Camp and the Pinetorch Trailhead. The Owl Creek Horse Camp has a toilet (SST) and hitch racks. It is being considered for upgrade and expansion. A waterline grant and cooperative project with Lawrence County is expected to provide water to the camp by 2004. This trail network is located in Area 2 of the proposed action.

Hurricane Shooting Range

The Hurricane Shooting range has a firearms range with 4 shooting benches that accommodate 2 shooters each. One of these benches is fully ADA compliant. There is an archery range that remains closed because of damage from southern pine beetle activity. A toilet (SST) and paved trail are also a part of the area.

Sipsey River Recreation Area

The Sipsey River Recreation Area is located on the Sipsey Wild and Scenic River at the southern edge of the Sipsey Wilderness. The recreation area has walking trail approximately ½ mile in length that accesses a group shelter built by the Civilian Conservation Corps in the 1930's. The trail follows along a beautiful bluff line with large hemlocks and poplar trees. Several waterfalls and the Sipsey River are easily seen from this trail. A canoe launch serves the floaters – most use occurs from January through May. Twelve (12) picnic tables are scattered throughout the area. Toilet facilities are available in the nearby Sipsey Wilderness Trailhead.

Sipsey Wilderness Area

At 25,002 acres, the Sipsey Wilderness Area is the second largest wilderness within the Southern Region of the USDA Forest Service. There are 8 trails (33.4 miles) that are open for hiking only, mostly following the streams and hardwood forests in the wilderness. In addition, 4 routes (13.3 miles) are open for horse, wagon and hiking use; these routes are former roads and mostly follow ridges and wind between drainages. The Sipsey has 6 trailheads (Sipsey River, Randolph, Thompson, Gum Pond, Braziel and Borden) that provide trailhead information and parking for visitors.

McDougle, Wolfpen & Allred Hunter Camps

Three camps are designated hunter camps. Hunters who camp during the deer firearms season are required to camp in one of these camps. These camps are available for others to use throughout the year. There are no facilities or developed sites at these camps, except for a toilet (SST) at McDougle Camp.

Biological Assessment
of
Proposed, Threatened, Endangered and Candidate Species
Forest Health and Restoration Project

Bankhead National Forest
Lawrence, Winston and Franklin Counties, Alabama

Introduction

This Biological Assessment (BA) summarizes and documents the process and makes determinations regarding the effects on the Proposed, Endangered, Threatened and Candidate species of the Bankhead National Forest for management activities as proposed within the Forest Health and Restoration Project.

A Biological Assessment, in coordination with formal consultation with the Fish and Wildlife Service, is required for proposed U.S. Forest Service management actions that have the potential to effect Proposed, Threatened, Endangered and Candidate Species.

Forest Service Manual 2670.31, requires the Forest Service through the biological evaluation process to review actions and programs authorized, funded, or carried out to determine their potential for effect upon threatened and endangered species and species proposed for listing. In addition, the Forest Service shall initiate consultation with the Fish and Wildlife Service when the agency determines that proposed activities may have an effect on threatened or endangered species; is likely to jeopardize the continued existence of a proposed species; or result in the destruction or adverse modification of critical or proposed critical habitat. In conjunction with the regulatory agencies, actions should be taken to identify and prescribe measures to prevent adverse modification or destruction of critical habitat and other habitats essential for the conservation of endangered, threatened and candidate species.

Method of Species Selection and Analysis

The most recent list of species from the Fish and Wildlife Service, the current Regional Forester's Sensitive Species list and databases maintained by the Forest Service were reviewed to develop a list of federally listed species of potential concern for the Bankhead National Forest. Further refinement was done by an examination of distribution maps and habitat data for various species. Species were excluded from further consideration only if there was a high degree of certainty that the species does not continue to inhabit Forest Service lands within Bankhead National Forest. Species considered to be extinct are not included but species that inhabit nearby areas are retained for analysis. In addition, the distribution and occurrence of rare communities were reviewed for their potential to harbor listed species.

Species are included in detailed effects analysis if they are known or likely to inhabit the Bankhead National Forest. Species are also discussed if suitable habitat is present and the species is known or likely to inhabit nearby areas.

FEDERALLY LISTED SPECIES – BANKHEAD NATIONAL FOREST

A list of Proposed, Threatened, Endangered and Candidate species known, or suspected, to occur, on or near, one or more of the management units comprising the Bankhead National Forest are as follows:

Table BA.A - Federally Listed Terrestrial Animals

Scientific Name	Common Name	Federal Status ¹	Occurrence ²
<i>Myotis grisescens</i>	Gray bat	E	R
<i>Myotis sodalis</i>	Indiana bat	E	R
<i>Haliaeetus leucocephalus</i>	Bald eagle	T	R
<i>Picoides borealis</i>	Red-cockaded woodpecker	E	X

¹ **Status:** E = endangered; T = threatened; P = proposed; C = candidate; TSA = threatened due to similar appearance; S = sensitive (USFS, Southeast Region) It should be noted that some species are listed which have historical occurrence in the vicinity of National Forest lands, are located on private lands within the administrative boundaries, or are known to occur in one of the counties unit occurs within. ²

Occurrence: R= Indicates species is acknowledged as known to be present (presence may be only migrational stopover, post-breeding dispersal, etc., or presence may be as seasonal or year-round resident), high potential for presence, or presence is known from near/adjacent lands, and presumed to be present on National Forest Management Unit. X = Species is Not Known, Historic, Extirpated, or Outside of Range on Management Unit.

Table BA.B - Federally Listed Aquatic Animals

Scientific Name	Common Name	Federal Status ¹	Occurrence ²
<i>Sternotherus depressus</i>	Flattened musk turtle	T	R
<i>Epioblasma metastriata</i>	Upland combshell	E	X
<i>Epioblasma turgidula</i>	Turgid blossom pearly mussel	E	X
<i>Epioblasma brevidens</i>	Cumberlandian combshell	E	X
<i>Lampsilis altilis</i>	Fine-lined pocketbook	E	R
<i>Lampsilis orbiculata</i>	Pink mucket (pearlymussel)	E	X
<i>Lampsilis perovalis</i>	Orange-nacre mucket	T	R
<i>Medionidus acutissimus</i>	Alabama moccasinshell	T	R
<i>Medionidus parvulus</i>	Coosa moccasinshell	E	X
<i>Pleurobema furvum</i>	Dark pigtoe	E	R
<i>Pleurobema perovatum</i>	Ovate clubshell	E	X
<i>Pleurobema plenum</i>	Rough pigtoe	E	X
<i>Ptychobranhus greeni</i>	Triangular kidneyshell	E	R
<i>Necturus alabamensis</i>	Black Warrior waterdog	SC	R

¹ Status: E = endangered; T = threatened; P = proposed; C = candidate; TSA = threatened due to similar appearance; S = sensitive (USFS, Southeast Region) It should be noted that some species are listed which have historical occurrence in the vicinity of National Forest lands, are located on private lands within the administrative boundaries, or are known to occur in one of the counties unit occurs within.

² Occurrence: R = Indicates species is acknowledged as known to be present (presence may be only migrational stopover, post-breeding dispersal, etc., or presence may be as seasonal or year-round resident), high potential for presence, or presence is known from near/adjacent lands, and presumed to be present on National Forest Management Unit. X = Species is Not Known, Historic, Extirpated, or Outside of Range on Management Unit.

Table BA.C - Federally Listed Aquatic and Terrestrial Plants

Scientific Name	Common Name	Status ¹	Occurrence ²
<i>Dalea foliosa</i>	Leafy prairie clover	E	R
<i>Helianthus eggertii</i>	Eggert's sunflower	T	R
<i>Lesquerella lyrata</i>	Lyrate bladder-pod	T	X
<i>Marshallia mohrii</i>	Mohr's Barbara's buttons	T	R
<i>Sagittaria secundifolia</i>	Kral's water-plantain	T	R
<i>Thelypteris pilosa</i> var <i>al.</i>	Alabama streak-sorus fern	T	R
<i>Xyris tennesseensis</i>	Tennessee yellow-eyed grass	E	R
<i>Leavenworthia crassa</i>	Fleshy-fruit glade cress	SC	R
<i>Platanthera integrilabia</i>	White fringeless orchid	SC	R

¹ **Status:** E = endangered; T = threatened; P = proposed; C = candidate; TSA = threatened due to similar appearance; S = sensitive (USFS, Southeast Region) It should be noted that some species are listed which have historical occurrence in the vicinity of National Forest lands, are located on private lands within the administrative boundaries, or are known to occur in one of the counties unit occurs within.

² **Occurrence:** X = Indicates species is acknowledged as known to be present (presence may be only migrational stopover, post-breeding dispersal, etc., or presence may be as seasonal or year-round resident), high potential for presence, or presence is known from near/adjacent lands, and presumed to be present on National Forest Management Unit. X = Species is Not Known, Historic, Extirpated, or Outside of Range on Management Unit.

I. EXPLANATION OF DETERMINATIONS

Determinations and the Needed Follow-up Actions: The determination of effects for Federally Listed Species are: 1) No Effect; 2) Is not likely to adversely affect; 3) Is likely to adversely affect. All the possible effects can and should be included within one of the above determinations. The needed follow-up actions vary depending on the type of species and the determination.

A “no effect” determination should be used when the proposed actions have no effects on the proposed, endangered, threatened and sensitive or locally rare (PETS) species or critical habitat. No follow-up action is required for this determination.

A determination of “is not likely to adversely affect” should be used for discountable, insignificant or beneficial effects. If the determination of “is not likely to adversely affect,” written concurrence is required from the FWS for both proposed and listed species.

Discountable effects are those extremely unlikely to occur. Based upon best judgment, a person would not be able to meaningfully measure, detect or evaluate insignificant effects.

Insignificant effects relate in size of the impact and should never reach the scale where take occurs.

Beneficial effects are positive effects without any adverse effect to the species.

A determination of “**is likely to adversely affect**” should be used if any adverse effect to a listed species may occur as a direct or indirect result of the proposed action. If the determination is “likely to adversely affect” and the species is proposed for listing, conference with the FWS is required. If the determination of “is likely to adversely affect” and the species is listed as threatened or endangered, formal consultation with the FWS is required by Endangered Species Act of 1973 as amended, (ESA), section 7.

Conference is a legally required “informal consultation” with the FWS. If the determination is “likely to adversely affect” and the species is listed as threatened or endangered, Formal Consultation with the FWS is required. All requests to initiate Formal Consultation must be sent through the Regional Forester. With sensitive species, follow-up action with the FWS is not required for any determination of effects. No action is required for determinations of “no effect” or “beneficial impacts.” For “may impact individuals but not likely to cause a trend to federal listing or loss of viability,” mitigating measures that will minimize the negative impacts should be developed. If the determination is “likely to result in trend to federal listing, or loss of viability,” the proposed actions should be modified so that one of the other 3 determinations is appropriate. Sensitive species must receive special management emphasis to ensure their viability and to preclude the need for Federal listing.

II. FEDERALLY LISTED (T & E) SPECIES

This section provides information on the determinations of effects on federally listed plant and animal species on the Bankhead National Forest. Other federally listed species are not discussed due to lack of presence in the geographical area, unsuitable habitat conditions, and/or lack a “high probability of occurrence” on national forest lands.

II. A. FEDERALLY LISTED TERRESTRIAL ANIMALS

- Red-cockaded woodpecker (*Picoides borealis*) – E
- Bald eagle (*Haliaeetus leucocephalus*) - T
- Gray bat (*Myotis grisescens*) - E
- Indiana bat (*Myotis sodalis*) - E

II. A. 1. Red-cockaded woodpecker (*Picoides borealis*)

II. A. 1. a. Environmental Baseline

The red-cockaded woodpecker (*Picoides borealis*) is a federally listed endangered species endemic to open, mature and old-growth pine ecosystems in the southeastern United States. The red-cockaded woodpecker was listed as endangered in 1970 (35 Federal Register 16047) and received federal protection under the Endangered Species Act of 1973. The precipitous decline in population size that led to the species’ listing was caused by an almost complete loss of habitat. Fire-maintained old-growth pine savannas and woodlands that once dominated the southeast, no longer exist except in a few, isolated, small patches. Longleaf pine (*Pinus palustris*) ecosystems, of primary importance to red-cockaded woodpeckers, are now among the most endangered ecosystems on earth. Shortleaf (*P. echinata*), loblolly (*P. taeda*), and slash pine

(*P. elliotii*) ecosystems, important to red-cockaded woodpeckers outside the range of longleaf, also have suffered severe declines (USFWS, 2000).

In 1986, nine populations of red-cockaded woodpeckers existed on National Forest lands in Southern Appalachian Forests (Costa and Escano, 1989). Red-cockaded woodpecker populations were on Bankhead NF at that time but were extirpated by 1992. In 1986 the Bankhead National Forest had one active cluster with a very small population.

Unlike earlier declines that led to the species' listing, these extirpations were not the result of timber harvesting. Two trends account for these later population extirpations: first, a loss of the two-layered, (open pine canopy and herbaceous groundcover) forest structure; followed by a loss of the pine-dominated forest composition, required by red-cockaded woodpeckers. Hardwood midstory within active clusters has been associated with cluster abandonment (Loeb et al. 1992). These extirpations were the result of unimpeded succession, through a lack of adequate burning and thinning in pine and pine-hardwood stands. Fire suppression has severe and numerous impacts on southern pine ecosystems, including changes in tree species composition and forest structure (USFWS, 2000).

Currently there are no known populations of red-cockaded woodpecker remaining on the Bankhead National Forest or adjacent private lands. For this reason no further evaluations for this species will be performed.

II. A. 1. b. Determination of Effect

Because this species no longer occurs in the area and is not known to nest, have roosts or have permanent habitat on Bankhead National Forest or adjacent lands, the Forest Health and Restoration Project and alternatives will have **"No Effect"** on the red cockaded woodpecker.

II. A. 2. Bald eagle (*Haliaeetus leucocephalus*)

II. A. 2. a. Environmental Baseline

The bald eagle ranges over most of the North American continent, from as far north as Alaska and Canada, down to Mexico. Experts believe that in 1782 when the bald eagle was adopted as our national bird, their numbers may have ranged from 25,000 to 75,000 nesting pairs in the lower 48 states. Since that time the species has suffered from habitat destruction and degradation, illegal shooting, and most notably from contamination of its food source by the pesticide DDT. In the early 1960's, only 417 nesting pairs were found in the lower 48 states. In 1999, more than 5,748 nesting pairs of bald eagles were recorded for the same area, resulting primarily from the banning of DDT in the United States in 1972 aided by additional protection afforded under the Endangered Species Act (USDI, Fish & Wildlife Service, 1999).

Bald eagles have few natural enemies but usually prefer an environment of quiet isolation from areas of human activity (i.e. boat traffic, pedestrians, or buildings), especially for nesting. Their breeding areas are generally close to coastal areas, bays, rivers, lakes, or other bodies of water that reflect general availability of primary food sources including fish, waterfowl, rodents, reptiles, amphibians, seabirds, and carrion (Andrew and Mosher 1982, Green 1985, Campbell et al. 1990). Although nesting territory size is variable, it typically may encompass about 2.59 square kilometers (Abbott, 1978). Most nest sites are found in the midst of large wooded areas adjacent to marshes, on farmland, or in logged-over areas where scattered seed trees remain (Andrew and Mosher, 1982). The same nest may be used year after year, or the birds may alternate between two nest sites in successive years. Bald eagles mate for life and are believed to live 30 years or more in the wild. Although bald eagles may range over great distances, they usually return to nest within 100 miles of where they were raised (USDI, Fish & Wildlife Service, 1995).

Winter home ranges for eagles can be very large, especially for non-breeding birds. They generally winter throughout the breeding range but are more frequent along the coast. These birds commonly roost communally. The Bald Eagle was a locally common, breeding and wintering resident in Alabama, on the Gulf Coast and in the Tennessee Valley before 1960 (Imhof, 1976). Today the species is a rare to uncommon breeding and wintering resident. There have been confirmed sightings on the Bankhead National Forest, usually around large bodies of water such as Lewis Smith Lake. There are no known nests within the area, nor have any been recorded in the area within the recent past.

The primary threats to the bald eagle include loss of nesting, foraging, and roosting habitat especially along shorelines, disturbance by humans, biocide contamination, decreasing food supply, and illegal shooting (Byrd and Johnstone, 1991, Buehler, D.A., et al, 1991). Bald eagles also have died from lead poisoning as a result of feeding on waterfowl that had inadvertently ingested lead shot. In 1991, the U.S. Fish and Wildlife Service completed a program to phase out lead shot for waterfowl hunting.

II. A. 2. b. Direct, Indirect, and Cumulative Effects

Timber harvesting or road building activities have the potential to impact the bald eagle or its habitat should this activity occur near lakes or other potential habitat. Human disturbance from roads and similar activities can also adversely affect the use of an area for nesting or roosting by eagles.

A standard 1500 foot protection zone around bald eagle nests and communal roost sites is generally accepted by resource agencies as an adequate buffer. This would be recognized if a nest were found. Vegetation management that would affect forest canopy within these zones is prohibited, and other activities that may disturb eagles are prohibited within these zones during periods of use. The emphasis on low levels of disturbance and maintenance of riparian areas of mature forest, provides direction for management of shorelines where bald eagles may forage. No additional specific provisions related to foraging habitat are necessary; due to the variety of circumstances that may be involved, these issues would be addressed during site-specific analysis.

II. A. 2. c. Determination of Effect

Because this species is only a temporary migrant and is not known to nest, have roosts or have permanent habitat on Bankhead National Forest, the Forest Health and Restoration Project and alternatives are “**not likely to adversely affect**” the bald eagle, and should provide conditions beneficial to this species.

II. A. 3. Gray bat (*Myotis grisescens*)

II. A. 3. a. Environmental Baseline

The gray bat occupies a limited geographic range in limestone karst areas of the southeastern U.S. (USDI FWS 1982). The bat is more narrowly restricted to cave habitats than any other mammal occurring in the U.S., and occupies caves year-round. Most individuals migrate seasonally between maternity and hibernating caves. About 95% of the known population inhabits nine winter caves.

Limiting factors for the gray bat may include cold caves in the southern portion of its range. A key cause of decline appears to be human disturbance and loss of cave habitat quality. The recovery plan (USDI FWS 1982) recommends actions focused on cave gating.

Deforestation of areas around occupied cave entrances and in between caves and large water sources (feeding corridors) may have a detrimental effect. Forest cover provides protection from predators, especially for young bats. Retention of forested corridors around cave entrances,

along river and perennial stream edges, and along reservoir shorelines within 25 km of known gray bat maternity caves is important for species protection (USDI FWS 1982; LaVal et al. 1977; Best et al. 1995).

Although the gray bat is currently listed as endangered, some bat researchers have endorsed a proposed status change to threatened status (down-listing) due to population increases and successful protection of many inhabited caves (Currie and Harvey 2002). Gray bats are now estimated to number over 2.6 million individuals.

Both major hibernacula and important maternity caves are known from Alabama and Tennessee. However, those caves are over 50 miles from the nearest Forest Service management unit. Small numbers of gray bats are known to hibernate in two caves on Bankhead National Forest. No maternity sites are known or have been found to exist on or within the proclamation boundary.

II. A. 3. b. Direct, Indirect, and Cumulative Effects

Possible effects under any or all alternatives of the Forest Health and Restoration Project include alteration of forest cover through various management activities. There is opportunity for impacts to the species if these activities are within close proximity to cave habitats and result in the excessive disturbance of a maternity cave during a forest management activity.

Effects to gray bat caves would be the same under all alternatives. For each alternative, existing standards of the Forest Land and Resource Management Plan or the requirements of the Biological Opinion for Indiana and gray bats (Wilson 1999) would provide a protection zone to protect all hibernacula and maternity colony sites that may be discovered.

Effects on foraging habitat are expected to be similar under all alternatives since riparian corridors will be well protected by streamside management zone guidelines. In addition, Bankhead National Forest will retain its pre-existing streamside management zone guidelines that provide protection of ephemeral drainages. These standards will not only provide forest cover for foraging and protection from predation, but will also ensure high water quality to support the aquatic insect prey base.

In general, effects to the gray bat would be similar under all alternatives, as protective mechanisms are in place. For each alternative, standards of the Forest Land and Resource Management Plan or the requirements of the Biological Opinion for Indiana and Gray Bats (Wilson 1999) would provide protection zones for all hibernacula and maternity colony sites that are known or may be discovered. Coordination with Fish and Wildlife will be done for any project site within this vicinity. All requirements related to retention of streamside management zones will be followed to protect riparian sites that may be utilized by the gray bat. For any alternative that allows active vegetation management such as site preparation activity, thinning operations or temporary road construction that occurs during the period when young are nonvolant, there is a small potential for “take”. However, standards described above would minimize the chance of take for all alternatives.

Prescribed burning plans will identify caves as potentially smoke-sensitive targets. Location of caves will be considered when planning and conducting fire line construction.

However, the benefits to this species would potentially be greater under those alternatives that provide thinning treatment to the largest acreages. The existing stands of loblolly pine that have not been thinned, provide little or no habitat for this species. If these stands are thinned, at least they have the potential to provide foraging areas.

II. A. 3. c. Determination of Effect

The Forest Health and Restoration Project and its alternatives **“may affect, not likely to adversely affect”** this species because habitat management alternatives address the critical needs for habitat and protection of the gray bat. Based upon these findings and existing requirements

for habitat conservation, the selection of any alternative should maintain foraging, roosting and maternity/hibernacula habitat conditions for this species.

II. A. 4. Indiana bat (*Myotis sodalis*)

II. A. 4. a. Environmental Baseline

The distribution of Indiana bats is generally associated with limestone caves in the eastern U.S. (Menzel et al. 2001). Within this range, the bats occupy two distinct types of habitat. During summer months, maternity colonies of adult females roost under sloughing bark of dead and partially-dead trees of many species, often in forested settings (Callahan et al. 1997). Reproductive females require multiple alternate roost trees to fulfill summer habitat needs. Adults forage on winged insects within three miles of the occupied maternity roost. Swarming of both males and females and subsequent mating activity occurs at cave entrances prior to hibernation (MacGregor et al. 1999). During this autumn period, bats roost under loose, sloughing bark and in cracks of dead, partially-dead and live trees.

Wintering colonies require very specific climatic regimes within cold, humid caves primarily west of the Appalachian Mountains (Barbour and Davis 1969; Menzel et al. 2001). Few sites provide these conditions, and approximately 85% of the entire known population inhabits only nine caves or mines (Menzel et al. 2001; USDI FWS 1999).

Although most hibernacula have been protected, the Indiana bat range-wide population has declined by about 60% since the 1960's (USDI FWS 1999). Causes of decline are not known; declines have continued despite efforts to protect all known major hibernacula. Researchers are focusing studies on land use practices in summer habitat, heavy metals, pesticides and genetic variability in attempt to find causes for the declines.

Small winter populations of Indiana bats were found in two caves on the Bankhead National Forest in February, 1999. Their presence and use of the caves has been verified in subsequent years. Monitoring efforts are ongoing by Forest Service, U.S. Fish and Wildlife Service, Alabama Department of Conservation and Natural Resources and Alabama A & M University.

Recommended habitat management includes protecting known significant hibernacula from human impacts and retaining forested condition around the entrances to significant hibernacula. (Menzel et al. 2001).

It is difficult to quantify summer roosting habitat for Indiana bat at a range-wide, regional or local level due to the variability of known roost sites and lack of knowledge about landscape scale habitat characteristics of maternity roosts. Forest management practices that affect occupied roost trees may have local impacts on Indiana bat populations. However, the bats live in highly altered landscapes, depend on an ephemeral resource, dead and dying trees, and may be very adaptable. Anecdotal evidence suggest that these bats may respond positively to some degree of habitat disturbance (USDI FWS 1999).

Research is needed on the effects of forest management on Indiana bat summer roosting ecology (Menzel et al. 2001) in Alabama. Current research efforts are seeking to establish the use of Bankhead National Forest by Indiana bats outside of the hibernation period. Research partially funded by Forest Service has documented the use of tree roosts on Bankhead National Forests in fall, prior to the winter hibernation period. No maternity roosts or summer tree roosts have been identified on Bankhead National Forest. However, there is a strong likelihood that portions of Bankhead National Forest may support summer maternity colonies (Tuttle personal communication 2001).

General practices that would help ensure adequate roost habitat include; retention of snags whenever possible; prescribed burning to restore and maintain uncluttered, open midstory foraging conditions (by thinning and using prescribed burning in cool season); and ensuring a

continuous supply of oaks, hickories, and ash as well as other trees with exfoliating bark (Menzel et al. 2001).

II. A. 4. b. Direct, Indirect, and Cumulative Effects

In general, effects to this species would be similar under all alternatives. For each alternative, standards of the Forest Land and Resource Management Plan or the requirements of the Biological Opinion for Indiana and Gray Bats (Wilson 1999) would provide protection zones for all hibernacula and maternity colony sites that are known or may be discovered. Coordination with Fish and Wildlife will be done for any site within this vicinity. Prescribed burning plans will identify caves as potentially smoke-sensitive targets. Location of caves will be considered during planning for the prescribed burn and fire line construction. All requirements related to retention of streamside management zones will be followed to protect riparian sites that may be utilized by the Indiana bat. Trees, that are known to be utilized as roost trees will be avoided during forest management activities. All Forest Service guidelines for the retention of live trees that have high potential as roost trees, will be followed to allow for future development of habitat. For all alternatives, retention of dead snags and high priority roost trees will be required for any activity that removes tree stems such as thinning or site preparation activities. For any alternative that allows active vegetation management such as site preparation activity, thinning operations or temporary road construction that occurs during the period when young are nonvolant, there is a small potential for “take” of a maternity roost tree. However, standards described above would minimize the chance of take for all alternatives.

However, the benefits to this species would potentially be greater under those alternatives that provide thinning treatment to the largest acreages. The existing stands of loblolly pine that have not been thinned, provide little or no habitat for this species. If these stands are thinned, they have the potential to provide foraging areas.

Alternative 1 (No Action) would essentially eliminate Indiana bat use of the acreages with unthinned pine stands. These areas have too much vegetation to be useful as foraging areas for bats.

Implementation of Alternative 2 could result in the highest levels of vegetation disturbance by thinning and site preparation activity because it treats the largest acreage, over all other alternatives.

Alternatives 3, 5 and 6 would potentially provide more foraging habitat than is currently available to Indiana bats. This would be accomplished primarily by the use of thinning existing pine stands; establishing open, “woodland” conditions that allow a maximum area above, between and over the canopy for foraging bats; and prescribed burning to maintain the insect rich herbaceous/shrub community below the forested overstory. Properly implemented prescribed burns have potential to provide beneficial effects including improvement of foraging habitat conditions and creation of additional snag roosts. The flame lengths of dormant season prescribed burns are not likely to have a direct effect on roost trees, and Indiana bats would be absent from the general forest area during this period. Smoke management from the burns will be such that the known caves are not directly in the path of the smoke plume and dispersion indices are in place to preclude smoke management concerns. Location of post burn smoke will also be considered during planning. Post burn smoke shall not accumulate in the drains where caves are located.

Alternative 4 would be beneficial in that it would provide for thinning of existing pine stands. It will allow restoration to hardwoods which is generally beneficial, as Indiana bats utilize mixed stands of hardwood and pine trees. This alternative has greatly reduced acreages of open, “woodland” condition stands and the use of prescribed fire is reduced as compared to alternatives 3, 5, and 6.

Considering the cumulative effects on the Indiana bat from practices within the Forest Health and Restoration Project there should be a net gain of habitat for alternatives that provide thinning of pine stands as well as provide and maintain open, “woodland” conditions. All types of vegetation treatments (thinning and site preparation) would require varying levels of snag retention and specific retention of leave trees as defined by the Forest Land Resource Management Plan and the Indiana Bat Biological Opinion of 1999.

II. A. 4. c. Determination of Effect

For alternatives 1 – 6 the determination of effect is “may effect, not likely to adversely affect” for the Indiana bat. Management direction addresses the critical needs for habitat and protection of the Indiana bat and should improve or maintain foraging, roosting and hibernacula habitat conditions for this species. The levels of vegetation management allowed within cave protection zones are not likely to diminish summer roosting or foraging habitat in a significant way. Summer roosting use on Bankhead National Forest has not been established by ongoing research efforts. However, the possibility for “take” cannot be completely eliminated with any level of management. Forestwide standards should reduce the potential for “take” to levels that are insignificant and discountable.

II. CONSOLIDATED LIST OF TERRESTRIAL T&E SPECIES WITH DETERMINATIONS

Table BA.D - Determination of Effects for Federally Listed Terrestrial Animals

Scientific Name	Common Name	Determination of Effects
<i>Picoides borealis</i>	Red-cockaded woodpecker	No Effect
<i>Haliaeetus leucocephalus</i>	Bald eagle	Not likely to adversely affect
<i>Myotis grisescens</i>	Gray bat	Not likely to adversely affect
<i>Myotis sodalis</i>	Indiana bat	Not likely to adversely affect

II. B. AQUATIC SPECIES

- Black Warrior waterdog (*Necturus alabamensis*) - C
- Flattened musk turtle (*Sternotherus depressus*) – T
- Cumberlandian combshell (*Epioblasma brividens*) - E
- Turgid blossom pearlymussel (*Epioblasma turgidula*)- E
- Pink Mucket pearlymussel (*Lampsilis orbiculata*) – E
- Rough Pigtoe (*Pleurobema plenum*) - E
- Upland combshell (*E. metastriata*) - E
- Fine-lined pocket book (*Lampsilis altus*) – T
- Orange-nacre mucket (*L. perovalis*) – T
- Alabama moccasinshell (*Medionidus acutissimus*) - T
- Coosa moccasinshell (*M. parvulus*) - E
- Dark pigtoe (*P. furvum*) – E
- Ovate clubshell (*P. perovatum*) – E
- Triangular kidneyshell (*Ptychobranhus greenii*) – E

The National Forests encompass less than 3% of the state's land-mass but support more than 60% of the federally listed freshwater species. There are 13 federally listed aquatic species (T&E) including 9 endangered and 4 threatened species located on or near the Bankhead National Forest. In addition, there is 1 candidate species associated with the Bankhead National Forest. Critical habitat has been proposed for 11 freshwater mussel species on or near the Bankhead National Forest.

Most T&E species inhabit the aquatic habitats associated the 7,700 miles of streams and rivers of the Bankhead National Forest. Although most T&E species are highly specialized in their selection of micro-habitat, all species seem to have similar basic habitat requirements. Consequently, there are some commonalities of potential effects of management activities among all T&E species. All T&E species are sensitive to varying degrees to alterations in habitat structure, water quality, sediment and in less obvious ways to the quality and quantity of interaction with the riparian zone. Various practices of the Forest Health and Restoration Project potentially could impact several of these parameters.

Habitat Structure

Habitat structure is perhaps the most significant environmental factor for a wide variety of aquatic species. Habitat alterations can have adverse impacts on aquatic organisms through loss of habitat, reduction in habitat quality, and blockage of travel and re-colonization corridors (Moyle and Leidy 1992). However, due to their location, extent and intensity, proposed Forest Health and Restoration Project activities are highly unlikely to result in modifications to aquatic habitat. Road crossings are the only Forest Service activity that presently occur within and have potential to directly modify the structure of riverine and stream aquatic habitat.

With any of the potential alternatives of the Forest Health and Restoration Project only temporary roads will be constructed. No permanent road construction is planned or proposed. All streamside management zones within each treatment area will be protected in accordance with the guidelines of the Forest Land and Resource Management Plan and its amendments or its subsequent revisions. Current riparian and streamside management standards include construction precautions for use of temporary roads. Temporary roads will cross streams only on

temporary bridges or low water fords. Road crossings are configured to minimize the footprint within the riparian zone. Streamside management zone standards would also apply to protect water quality. If stream-crossings are necessary, they will be constructed in accordance with above-mentioned procedures. Temporary access roads, which may be constructed, will be equipped with water bars and turn outs or will be established to vegetative cover for protection against erosion, as soon as possible, following the site activity. Log landings and loading decks will be disked, seeded, and mulched following the timber thinning activities. FS personnel will evaluate the need for additional erosion control measures with considerations made for the soil type and the percent slope of the area. Control measures include road closure, construction of water bars and turnouts, seeding, mulching and nutrient application.

Water Quality

Water quality is also a large risk factor in the viability of aquatic species. Historically, human activities ranging from forestry, residential development, industry and agriculture have contributed to alterations in water chemistry and other qualities (Abell et al. 2000). Direct effects of water quality degradation could include death of aquatic organisms due to reduction in oxygen availability, or a change in water chemistry or nutrients.

Nutrient enrichment is another category of potential water quality degradation. Forest Service activities that could contribute to nutrification include forest management activities such as thinning, prescribed burns and the use of fertilizers in soil conservation measures.

Management of forest health may decrease the likelihood of resource damaging wild fires and consequential run-off and mobilization of ash and nutrients. Minimum impact fire suppression techniques are to be used in sensitive areas and prescribed burning techniques are designed to minimize soil damage and sediment run-off through use of backing fires and stipulations on fire-line construction methods, maintenance, locations, and restoration within riparian and streamside management zones. Terrestrial fertilizers are generally limited in use for the purpose of establishing vegetation on bare soil and critically eroding areas. The current Forest Plan amendment 14 stipulates that fertilizer will only be used within streamside management zones and unscoured drains for either listed and sensitive species habitat restoration or vegetative control of non-point source pollution. Dormant season burns only remove the upper layer of leaf litter and duff, thus any mineral soil that will be exposed to soil erosion due to this activity would be minimal. Although a slight and temporary change in runoff immediately following a prescribed burn could be anticipated, it would be minor in nature as compared to that experienced with a wildfire situation. Properly managed fire should not adversely affect water quality or quantity. Any changes resulting from a prescribed burn during the dormant season would be short lived. As fire burns the surface leaf and litter layers the nutrients stored there are released. These nutrients are taken up by other plants and microorganisms or exported from the community. A recent study on the Talladega National Forest in Alabama by Auburn University compared water quality parameters in streams with thinning and prescribed burning within the watersheds. The initial findings revealed no major differences in water chemistry between managed streams (thinned and burned) and reference streams (Feminella 2000). Research from Clemson University (Van Lear) suggests that runoff concentrations of K, Ca, Mg, and Na were not significantly affected with prescribed fire. Research from Florida has demonstrated that fire will induce nitrogen fixation by soil micronutrients associated with plants and essentially replaces any nitrogen lost during the burn.

Mussels can experience minor, short-term changes with no negative effects, particularly during the winter (FWS 2000). The use of *prescribed* fire also reduces the possibility and intensity of resource damaging *wildfires*. These wildfires can result in increased sedimentation and serious changes in water chemistry due to the large area and the intense nature of occurrence. Large and intense wildfires within an watershed can have devastating effects upon aquatic ecosystems.

Conditions that occur in these situations are often characterized by high concentrations of ash and sediment entering streams to effectively eliminate much of the aquatic life.

Sediment

Sediment is identified as a key habitat feature of potential concern in many watersheds associated with the Bankhead National Forest. Management activities that mobilize fine sediments pose the largest potential affect to aquatic species. Sediment is an important factor in the suitability of aquatic habitat, but it may be less important than other factors within the Mobile River Basin largely because these systems are naturally prone to high sediment loading rates. The majority of aquatic species are largely tolerant of fine sediments. The headwater watersheds of the Bankhead National Forests support the vast majority of sediment sensitive species. Sediment mobilizing management activities are thus of great concern for the Bankhead National Forest.

Historically, most forested areas of Alabama have been impacted by intensive and extensive timber production practices of the past. Tillage for early agriculture also played a major role in the run-off of soils and siltation of waterways. Historical activities also resulted in drastic changes in channel morphology that are still evident today. Due to the overloading of sediments, some channels artificially aggraded while others down cut as a result of accelerated bank erosion. The Bankhead National Forest provides the most obvious examples of historical long-lasting channel alterations due to accelerated sediment runoff. Currently, the Forest Service engages in only a few activities that potentially could result in sediment run-off. These being practices that cause ground disturbance to the extent that soil erosion occurs.

Forestry practices within this Forest Health and Restoration Project are primarily thinning operations and site preparation activities. Thinning operations remove only a portion of the vegetative cover and disturb less areas of soil than that of a clear-cut harvest. Site preparation practices proposed within this project include the use of a drum chopper and site preparation burning. The drum chopper is perhaps the least soil disturbing mechanical method of site preparation available. Riparian and streamside zones are not included in planned thinning or site preparation areas. Responses to pest infestations have also been modified to avoid direct impacts to riparian corridors. Current management standards minimize soil disturbance within riparian habitat. Healthy well-vegetated riparian corridors provide a filtering capacity so that sediment may be trapped, deposited, and stored and less sediment reaches the stream or other water body. The direct and indirect effects of sediment transport, siltation, and turbidity, are thus expected to be minimized under all alternatives. Alternative 2 proposes the largest acreage to be treated, thus the potential for the largest amount of ground disturbance. Although other alternatives will also result in ground disturbance, it would be of lesser amounts than Alternative 2. Alternative 1 which is the no action alternative has no proposed ground disturbing practices that would result in increased sediment movement.

Riparian Interface

The importance of the riparian interface for T&E aquatic species is difficult to quantify. Reptiles and amphibians have obvious connections to riparian habitat since many species forage or reproduce within the streamside zone. Many species of reptiles and fish require riparian derived woody debris as an important component of their habitat structure. All aquatic species are tied to the riparian zone through the process of nutrient cycling.

The current Forest Plan and amendments have largely limited vegetative and silvicultural treatments within streamside and riparian zones. All work conducted as part of the Forest Health and Restoration Project will recognize these areas and their associated protection mechanisms. Sites to be thinned are primarily upland areas located on hillsides and ridges.

Similarly, the areas to be treated by site preparation and planting are located on upland areas with very little if any riparian interface. Any stream crossings would be regulated by the current forest plan and its amendments.

Summary of Effects to Aquatic Habitat and T&E Species

Overall effects of Alternatives 2-6 of the Forest Health and Restoration Project will be beneficial for aquatic habitat and T&E species (determination of no effect or not likely to adversely affect) as compared to the No Action alternative. The Forest Health and Restoration Project provides opportunities for habitat restoration and T&E species protection through contributions to recovery and conservation, participation in population and habitat enhancements and restoration and commitment to ongoing surveys and monitoring. However, there will still continue to be cumulative adverse effects and possibly some take of individuals of certain T&E species. More detailed effects analysis and species determinations are discussed as follows.

II.B.2 Black Warrior waterdog (*Necturus alabamensis*)

II. B.2.a. Environmental Baseline – Black Warrior waterdog

The Black Warrior waterdog is a candidate species under possible consideration for future federal listing. It is endemic to the upper Black Warrior River system in Alabama. Extant populations and historical habitats on or near the Bankhead National Forest are displayed in Table BA.E.

Table BA.E - Black Warrior waterdog

Overview of known or suspected Black Warrior waterdog occurrences and potential habitat within five miles of the Bankhead National Forest.

River Basin	Watersheds	Miles		Forest	Counties	Status	Viability Risk ¹		
		on	near				L	M	H
Black Warrior	Lower Brushy	13		Bankhead	Winston	Present			N
	L. Sipsey Fork	24			Winston	Present			N
	Upper Brushy	40			Winston	Present		F	
	U. Sipsey Fork	27			Lawrence	Present		F	
Total		104				Present			
¹ Viability risks: L = low, M = moderate, H = high, N = minimal FS influence, F = some FS influence									

Black Warrior waterdogs are aquatic salamanders which are found in a variety of headwater and mainstem streams upstream from the influence of Lewis Smith Lake. Optimal habitat appears to be free-flowing large streams or small rivers having healthy forested streamside zones. The Sipsey Fork population contains the greatest density within its range (Durflinger 2001). They appear to require detectable flow and ample leaf packs for cover and foraging. Other factors contributing to habitat quality include a low silt load and substrate deposits, low nutrient content and bacterial counts, moderate temperatures, and minimal overall chemical pollution.

The historic decline of Black Warrior waterdog populations may be attributed to habitat modification, sedimentation, eutrophication, and other forms of water quality degradation. They are rated as currently at risk in 2 out of 4 watersheds associated with the National Forests in Alabama. In both cases, the high-risk rating is due to influences outside of Forest Service control.

Potential direct and indirect impacts to this species from management practices of the Forest Health and Restoration Project include sedimentation and its impacts to water quality. Siltation may affect this species by burying leaf packs where they seek food and cover, by reducing the availability of oxygen, and loss of prey species with limited production of aquatic insects and by coating their external gills, reducing oxygen transfer, any of which would be detrimental to their collective health and population viability. Under the current Forest Land and Resource Management Plan and its amendments, forest-wide, streamside management zone and riparian standards will protect the Black Warrior waterdog and its habitat from any sediment that might be induced during management activities. Under planned management practices, vegetation treatments have been largely limited within the streamside and riparian zones. On the Bankhead National Forest, southern pine beetle control measures have not extended to the streambanks in order to protect visual and natural resource qualities of the wild and scenic corridor along the prime Black Warrior waterdog habitat of the Sipsey Fork.

Cumulatively, several on-forest (but not necessarily Forest Service controlled) reservoirs may continue to affect populations through altered flow, chemistry, and nutrient cycling, and as barriers to movements among tributaries. Habitat protection and monitoring will be the primary conservation objectives.

Overall direction of forest management activities provided in the Forest Health and Restoration Project will be beneficial for Black Warrior waterdogs. The practices that could potentially effect the Black Warrior waterdog would be those which disturb the soil, including thinning operations, temporary road construction and site preparation activities. If soil loss levels are maintained at or below the baseline soil tolerance there should be no effect on Black Warrior waterdogs. While existing protective mechanisms are in place to protect this aquatic species it is important to prevent excessive erosion by utilizing soil conservation measures for any practice that allows erosion levels to rise above the tolerance amount. This can be done by retaining ground cover of vegetative debris on thinning operations in steep areas, reducing the use of drum chopping in steep areas and by utilizing soil conservation measures prior to closure of temporary roads. However, there may still continue to be some cumulative adverse effects including the inundation and habitat fragmentation associated with reservoirs that are outside the scope of this project.

II. B.2.b. Determination of Effect – Black Warrior waterdog

When conservation opportunities arise, they will be coordinated with the U.S. Fish and Wildlife Service and the appropriate state agency. Given these positive opportunities for pro-active conservation of the species and the protection afforded by the Forest-wide and riparian standards, it is likely that negative effects will be avoided or mitigated and minimized to a discountable and insignificant level and overall effects on the species will be beneficial. It is therefore determined that the Forest Health and Restoration Project and its alternatives “**may affect, but is not likely to adversely affect**” this species.

II. B.3 Flattened musk turtle (*Sternotherus depressus*)

II. B.3.a. Environmental Baseline -- Flattened musk turtle

The flattened musk turtle was federally listed as threatened in 1987 (USFWS 1987). It is endemic to the upper Black Warrior River system in Alabama. Historically, it inhabited 10 to 20 percent of the streams in the upper third of this river basin. Currently, it has been extirpated from over 30% of its historical range. Within the current range, only about 15 % of the habitat seems to contain healthy, reproducing populations. Extant populations and potential habitats on or near Bankhead National Forest are displayed in Table BA.F. Studies of the flattened musk turtle are currently being conducted by a cooperative effort of the Forest Service, Alabama Power Company, The Nature Conservancy and the University of Alabama at Birmingham.

Table BA.F - Flattened musk turtle

Overview of known or suspected flattened musk turtle occurrences and potential habitat within five miles of the National Forests in Alabama.

River Basin	Watersheds	Miles		Forest	Counties	Status	Viability Risk ¹		
		on	near				L	M	H
Black Warrior	Clear	1 1		Bankhead	Winston	unknown			N
	Lewis Smith	2 4				present			N
	Lower Brushy	1 3				dense			F
	L. Sipsey Fork	2 4				present			F
	U. Sipsey Fork	2 7				present		F	
Total		9 9							
¹ Viability risks: L = low, M = moderate, H = high, N = minimal FS influence, F = some FS influence									

Flattened musk turtles are found in a variety of headwater streams and at scattered locations of stream inflow to Lewis Smith Lake. Optimal habitat appears to be free-flowing large streams or small rivers having vegetated shallows alternating with pools. They appear to require detectable currents and an abundance of crevices and submerged rocks for cover. Other factors contributing to habitat quality include abundant molluscan prey, a low silt load and substrate deposits, low nutrient content and bacterial counts, moderate temperatures, and minimal overall chemical pollution.

Historically, siltation, chemical pollution, and hydrological changes associated with mining, navigation, and flood control projects have had adverse effects on flattened musk turtles and their

habitat (Dodd et al. 1988). The turtle is particularly vulnerable to population decline due to late sexual maturity and a low reproductive rate. They are also highly dependant on adequate molluscan prey, a taxa that is highly vulnerable to decline due to sedimentation, pollution, and habitat alteration. Since they are dependant on molluscan prey, barriers to host fish may also be a factor. According to the recent rankings based on watershed conditions, 4 out of 5 watersheds rank as a high risk for flattened musk turtle viability, largely due to factors outside of the influence of the Forest Service.

II. B.3.b. Direct, Indirect, and Cumulative Effects – Flattened musk turtle

Direct and indirect potential impacts to this species from management practices of the Forest Health and Restoration Project include sedimentation and its impacts to water quality. Siltation may effect flattened musk turtles by eliminating or reducing their mollusk food supplies, altering the rocky habitats where they seek food and cover or by reducing the quality and availability of nesting sand bars. Under the current Forest Land and Resource Management Plan and its amendments, forest-wide, streamside management zone and riparian standards will protect the Flattened musk turtle and its habitat from any sediment that might be induced during management activities. Under planned management practices, vegetation treatments have been largely limited to upland areas outside of any streamside and riparian zones.

Overall direction of forest management activities provided in the Forest Health and Restoration Project will be beneficial for flattened musk turtles, as long as practices that have the potential to induce sediment into streams are conducted in such manner as to limit, reduce or minimize ground disturbance. The practices that could potentially effect this species would be those which disturb the soil, including thinning operations, temporary road construction and site preparation activities. If soil loss levels are maintained at or below the baseline soil tolerance there should be no effect on the flattened musk turtle. This will be the effect when these operations avoid steep slopes, utilize existing protective mechanisms such as those outlined in the Forest Land and Resource Management Plan, its amendments and revisions. While existing protective mechanisms are in place to protect this aquatic species it is important to prevent sediment from entering streams and water courses by utilizing soil conservation measures for any practice that allows erosion levels to rise above the acceptable levels. This can be done by retaining ground cover of vegetative debris on thinning operations in steep areas, reducing the use of drum chopping in steep areas and by utilizing soil conservation measures prior to closure of temporary roads. Outside the scope of this project, cumulative adverse effects including the inundation and habitat fragmentation associated with Lewis Smith reservoir.

On the Bankhead National Forest cut and leave or remove pest control measures have typically not extended to the streambanks in order to protect visual and natural resource qualities of the wild and scenic corridor along the prime turtle habitat of the Sipsey Fork. Cumulatively, several on-Forest (but not necessarily Forest Service controlled) reservoirs may continue to affect populations through altered flow, chemistry, and nutrient cycling, and as barriers to movements

among tributaries. Habitat protection and monitoring will be the primary conservation objectives. Representative populations and/or habitat will be monitored by either search or other approved indices depending upon local conditions and species abundance. Actions will be taken in order to identify additional suitable habitat and re-establish turtles and their mussel prey to unoccupied areas on National Forest lands to ensure population viability.

Even though the same protective mechanisms will be in place for Alternative 2 as the others, the overall larger volume of the acreage treated by Alternative 2 would have a potential for greater impact. Implementation of protective standards will be monitored and adjusted as needed. Where needed to protect this species from potential adverse effects of management activities, project-level surveys would be conducted in accordance with procedures outlined in the Southeast Region supplement of the Forest Service Manual (FSM 2672). However, there may

still continue to be some cumulative adverse effects including the inundation and habitat fragmentation associated with reservoirs although this is outside the scope of this project.

II. B.3.c. Determination of Effect – Flattened musk turtle

When recovery opportunities arise, they will be coordinated with the U.S. Fish and Wildlife Service and the appropriate state agency. Given these positive opportunities for pro-active conservation of the species and the protection afforded by the Forest-wide and riparian standards, it is likely that negative effects will be mitigated and minimized to a discountable and insignificant level and overall effects on the species will be beneficial. It is therefore my determination that the Alternatives 3 – 6 of the Forest Health and Restoration Project **may affect but is not likely to adversely affect the flattened musk turtle.**

II. B.4. Cumberlandian combshell (*Epioblasma brevidens*) Turgid blossom mussel (*Epioblasma turgidula*) Pink mucket pearlymussel (*Lampsilis orbiculata*) Rough pigtoe (*Pleurobema plenum*)

II. B.4. a. Environmental Baseline Cumberlandian combshell Turgid blossom mussel Pink mucket pearlymussel Rough pigtoe

These mussel species historically occurred throughout the mainstem of the Tennessee River basin in Alabama, Georgia, and Tennessee. Extant populations and historical or potential habitat on or near the National Forests in Alabama are displayed in Table BA.G.

Table BA.G - Four Mussel Species

Overview of Cumberlandian combshell, turgid blossom mussel, pink mucket pearlymussel, and rough pigtoe occurrences and potential habitat within five miles of the National Forests in Alabama.

River Basin	Watersheds	Miles		Forest	Counties	Status	Viability Risk ¹		
		on	near				L	M	H
Tennessee	Upper Bear		0	Bankhead	Lawrence	historical			N
Tennessee	Flint		0	Bankhead	Lawrence	historical			N
						historical			
¹ Viability risks: L = low, M = moderate, H = high, N = minimal FS influence, F = some FS influence									

These species were historically found on stable gravel-cobble substrate in shoals in large rivers with medium to fast current velocities. They are either considered as extirpated or have never

been found within the vicinity of Bankhead National Forest and thus are excluded from further consideration and evaluation. Although historical and critical habitat will be recognized, the procedures currently utilized for protection of water quality from silvicultural practices will provide protection of this habitat. Practices that have a potential to produce excessive levels of sediment should be restricted.

These species are excluded from additional analysis because they have been extirpated or were never known to exist in the Bankhead National Forest.

II. B.5. Upland combshell (*Epioblasma metastriata*) Conrad

II. B.5. a. Environmental Baseline – Upland combshell

The upland combshell was federally listed as endangered in 1993 (USFWS 1993). The species historically occurred in the Black Warrior, Cahaba, and Coosa Rivers, and some of their tributaries in Alabama, Georgia, and Tennessee. Recent surveys of historic habitat have been unable to locate any extant populations. The species may be extinct, however, biologists continue to retain hope that additional surveys may locate these mussels (USFWS 2003). Critical habitat has been proposed for 8 watersheds in Alabama, Georgia, and Tennessee (USFWS 2003). It is not known to exist within the streams of Bankhead National Forest. Historical, potential, and proposed critical habitats on or near Bankhead National Forest are displayed in Table BA.H.

Table BA.H - Upland combshell

Overview of upland combshell historical, potential, and proposed critical habitat within five miles of the National Forests in Alabama.

River Basin	Watersheds	Miles		Forest	Counties	Status	Viability Risk ¹		
		on	near				L	M	H
B. Warrior	U. Sipsey Fork	0	0	Bankhead	Winston	extirpated			
total		0	0						
¹ Viability risks: L = low, M = moderate, H = high, N = minimal FS influence, F = some FS influence									

Upland combshells were historically found on stable gravel-cobble substrate in shoals in medium rivers and large tributary streams with medium to fast current velocities. They are either considered as extirpated within the vicinity of Bankhead National Forest and thus are excluded from further consideration and evaluation. Although historical and critical habitat will be recognized, the procedures currently utilized for protection of water quality from silvicultural practices will provide protection of this habitat. Practices that have a potential to produce excessive levels of sediment should be restricted.

This species is thus excluded from further analysis because they have been extirpated or were never known to exist in the Bankhead National Forest.

II. B.6. Fine-lined pocketbook (*Lampsilis altilis*) Conrad

II. B.6.a. Environmental Baseline – Fine-lined pocketbook

The fine-lined pocketbook was federally listed as threatened in 1993. The species historically occurred in the Alabama, Tombigbee, Black Warrior, Cahaba, Tallapoosa, Coosa River systems,

and their tributaries. Currently, this species is limited to small streams above the fall line within the Cahaba, Coosa, and Tallapoosa River Basins (USFWS 2003). It is not currently known to exist within Bankhead National Forest although it historically had habitat in this area. This species is included in this analysis due to its having historical habitat within Bankhead National Forest and its being proposed for critical habitat designation. Critical habitat has been proposed for 12 watersheds including portions of the extant populations and historical habitats on or near Alabama National Forests these are displayed in Table BA.I.

Table BA.I - Fine-lined pocketbook

Overview of fine-lined pocketbook mussel historical, potential, and proposed critical habitat within five miles of the Bankhead National Forest.

River Basin	Watersheds	Miles		Forest	Counties	Status	Viability Risk ²		
		on	near				L	M	H
Black Warrior	Lower Brushy	13		Bankhead	Winston	historical		N	
	L. Sipsey Fork	24			Winston	historical			N
	Upper Brushy	40			Winston	historical		F	
	U. Sipsey Fork	27			Winston	historical		F	
Total		96							

¹Viability risks: L = low, M = moderate, H = high, N = minimal FS influence, F = some FS influence

This species is found in moderate to swift currents over stable sand, gravel, and cobble substrates in large rivers to small creeks.

The decline and extirpation of most populations of fine-lined pocketbook mussels may be attributed to habitat modification, sedimentation, eutrophication, and other forms of water quality degradation. Passage of host fish may also be a factor. The known or suspected extant populations of fine-lined pocketbook mussels probably inhabit less than half of the suitable habitat for this species within the Alabama National Forests. They are not known to exist on the Bankhead National Forest and thus are excluded from further consideration and evaluation. Although historical and critical habitat will be recognized, the procedures currently utilized for protection of water quality from silvicultural practices will provide protection of this habitat. Practices that have a potential to produce excessive levels of sediment should be restricted.

II. B.6.b. Direct, Indirect, and Cumulative Effects – Fine-lined Pocketbook

For populations of fine-lined pocketbook mussels and their proposed critical habitat on or near National Forests, potential management influences include any activity that could accelerate erosion or deposition, increase sedimentation or turbidity, alter water flow or chemistry, favor the spread of invasive species, or block host fish passage.

Siltation and turbidity may affect fine-lined pocketbook by altering the rocky interstitial spaces where they live and also by reducing foraging and reproductive effectiveness. While there is a background level of natural silt movement within the streams, if an action causes soil erosion it produces unnatural amounts that may cause resource damage. Under the proposed Forest Health and Restoration Project, the Forest-wide, streamside management zone and additional riparian standards will improve conditions within the historical habitat for the fine-lined pocketbook and

minimize or alleviate impacts to proposed critical habitat by preventing sediment released during management activities. Forest Service activities are not likely to be of the magnitude or intensity to affect water flow.

Current operations of the Lewis Smith dam and possible impacts to aquatic species are being addressed with Alabama Power Company through the Federal Energy Regulatory Commission (FERC) relicensing process. However, these operations are not under Forest Service permit.

Cumulative watershed effects from off-forest sources are of concern given the interspersed of private in-holdings on some sections of proposed critical habitat as the Forest Service has no authority on private land activities. Continued habitat and watershed protection, monitoring, and restoration will be the primary recovery objectives on Forest lands. Habitat and representative populations will be monitored in conjunction with comprehensive surveys and project monitoring. Monitoring will include either search indices or transects depending on local conditions and mussel densities.

The general direction and exercise of the practices, which are part of this proposal for Forest Health and Restoration, will ultimately lead to a healthy forest cover for the Bankhead National Forest. This situation will provide beneficial conditions for the watershed of this aquatic species. If the practices contained herein are implemented by utilizing standards of Forest Service procedures; the direct, indirect and cumulative effects of thinning, site preparation and implementation of practices to reach the desired future conditions, will be minimized. In this case, it is likely that any negative effects will be mitigated or minimized to a discountable and insignificant level. This will be beneficial for historical habitat of the fine-lined pocketbook and their proposed critical habitat as compared to the baseline conditions. Furthermore, the provisions contained within the proposed draft Forest Plan provides opportunities for proactive habitat restoration and species protection through consolidation of Forest ownership, contributions to recovery and conservation, participation in population and habitat enhancements and restoration, and commitment to ongoing surveys and monitoring.

II. B.6.c. Determination of Effect – Fine-lined Pocketbook

The determination is “not likely to adversely affect” for fine-lined pocketbook mussel. The rationale for this decision rests upon the fact if the project were conducted without regard to the habitat needs of this Federally listed species, there is potential for harm to the species by means of soil erosion from the project. Project resource protections as described will be utilized to protect water quality within streams and tributaries, thus protecting the habitat for this species.

Thus, given the protection afforded by the Forest-wide and riparian standards, historical habitat of the fine-lined pocketbook and their proposed critical habitat should benefit from a healthy forest cover across National Forest lands. It is therefore my determination that the practices and management actions necessary to carry out the Forest Health and Restoration Project are **not likely to adversely affect the fine-lined pocketbook mussel and may not adversely modify proposed critical habitat.**

III. B.7. Orange-nacre mucket (*Lampsilis perovalis*)

II. B. 7.a. Environmental Baseline – Orange-nacre mucket

The orange-nacre mucket was federally listed as threatened in 1993 (USFWS 1993). The species historically occurred in the mainstem and tributaries of the Alabama, Tombigbee, Black Warrior, and Cahaba, River systems in Alabama, Mississippi, and Georgia. Currently, the mussel may be extirpated from the mainstem Tombigbee, Black Warrior, and Alabama Rivers; however it may still be found within several river basins including the Black Warrior and Cahaba Rivers (USFWS 2003). Critical habitat has been proposed for 15 watersheds in Alabama and Mississippi (USFWS 2003). Portions of the proposed critical habitat are located in the Sipsey Fork largely on the Bankhead National Forest.

Populations and potential habitats on or near National Forests are displayed in Table BA.J.

Table BA.J - Orange-nacre mucket

Overview of the orange-nacre mucket historical, potential, and proposed critical habitat within five miles of the National Forests in Alabama.

River Basin	Watersheds	Miles		Forest	Counties	Status	Viability Risk ¹		
		on	near				L	M	H
Black Warrior	Clear	11		Bankhead	Winston	unlikely			N
	Lower Brushy	13				unknown		N	
	L. Sipsey Fork	24	>5			24 mi occupied C.Hab			N
	U. Sipsey Fork	27				27 mi occupied C.Hab		F	
Total		75							
¹ Viability risks: L = low, M = moderate, H = high, N = minimal FS influence, F = some FS influence									

This species inhabits streams and small rivers among stable sand, gravel, or cobble substrates in moderate to swift currents. Larval glochidia are released as superconglutinates (Haag et al. 1995) within the months of March through June (Hartfield and Butler 1997). Redeye bass, spotted bass, and largemouth bass have been identified as suitable fish hosts for the glochidia (Haag and Warren 1997). Freshwater mussels are filter feeders taking organic detritus, diatoms, phytoplankton, and zooplankton from the water column. As with many other freshwater mussels, orange-nacre muckets require clean gravel riffles and are especially susceptible to the threat of stream degradation resulting from low dissolved oxygen levels or high chlorine concentrations in waterways. Additionally, this species does not survive in impoundments and reservoirs. Other factors that can negatively impact freshwater mussels include contamination of waterways with pesticides, heavy metals, and other substances and the introduction of nonindigenous mollusks, such as the Asian clam and zebra mussel. The primary constituent elements of proposed critical habitat include: stable channels, appropriate flows, necessary water quality, clean substrates, available fish hosts, and lack of competitive nonnative species (USFWS 2003).

The decline and extirpation of most populations of orange-nacre mucket mussels may be attributed to habitat modification, sedimentation, eutrophication, and other forms of water quality degradation. Passage of host fish may also be a factor. The 7 known or suspected extant populations of orange-nacre muckets probably inhabit only a portion of the suitable habitat for this species within the Alabama National Forests. Recent drought conditions and existing barriers to fish passage may limit the extent of populations within the upper portions of most watersheds. Currently, only two known or suspected populations associated with the Alabama National Forests are considered moderately secure based upon analysis of potential watershed conditions that could place the species at risk. The remaining 5 watershed scale populations rank

as high risk but have limited opportunities for Forest Service involvement. One population (Upper Sipsey Fork) is potentially at risk of population decline due to reduced base flows and a downstream reservoir possibly reducing the ability of the species to re-colonize the upper watershed.

II. B.7.b. Direct, Indirect, and Cumulative Effects – Orange-nacre mucket

Orange-nacre muckets are fairly widely distributed across the Upper Sipsey and Upper Brushy drainage, including Thompson, Flannagin, and Borden creeks in Lawrence county and Caney, North Fork Caney, Brushy, Capsey, Rush, Brown and Beech Creeks in Winston county. They are also a species that can inhabit long reaches extending from the mainstem to tributary headwaters. Consequently, the potential effects of Forest Service management activities are much broader than for other mussel species that do not inhabit such a wide range of habitat. For populations of orange-nacre mucket mussels and their proposed critical habitat on or near National Forests, potential management influences include any activity that could accelerate erosion or deposition, increase sedimentation or turbidity, alter water flow or chemistry, favor the spread of invasive species, or block host fish passage.

Siltation and turbidity may affect orange-nacre muckets by altering the rocky interstitial spaces where they live and also by reducing foraging and reproductive effectiveness. The practices that could potentially effect this species would be those which disturb the soil, including thinning operations, temporary road construction and site preparation activities. Habitat will be protected by forest level actions to protect water quality. These actions include the use of erosion control measures on sloping areas of temporary roads, limited use of practices on areas with potential for excessive soil erosion, recognition of equipment restrictions within existing streamside management zones and adherence to guidelines for streamside management zones. Streamside management zone guidelines will be followed on every tract. Currently, there are no known stream crossings to be constructed within the habitat for this species. Thus, direct physical damage would be prevented to this species. Forest Service activities are not likely to be of the magnitude or intensity to affect water flow.

Erosion control efforts will be utilized by District personnel to prevent, reduce or control erosion. Indirect effects such as water quality degradation should be considered. This is addressed by employing mitigating measures. All proposed treatment sites for thinning or restoration, have streamside management zones and guidelines in place, thus no indirect effects are anticipated downstream.

Cumulative watershed effects are of particular concern given the interspersed of private in-holdings on some sections of proposed critical habitat. Continued habitat and watershed protection, monitoring, and restoration will be the primary recovery objectives. Habitat and representative populations will be monitored in conjunction with comprehensive surveys and project monitoring. Monitoring will include either search indices or transects depending on local conditions and mussel densities. Inventories of additional potential habitat areas will also be conducted.

The exercise of the practices, which are part of this proposal, will ultimately lead to a healthy forest cover for the Bankhead National Forest. This situation will provide beneficial conditions for the habitat of this aquatic species. If the practices contained herein are implemented by utilizing standards of Forest Service procedures; the direct, indirect and cumulative effects of thinning, site preparation and implementation of practices to reach the desired future conditions, will be minimized. In this case, it is likely that any negative effects will be mitigated, or minimized to a discountable and insignificant level.

II. B.7.c. Determination of Effect – Orange-nacre mucket

The determination is “not likely to adversely affect” for orange-nacre mucket mussel. The rationale for this decision rests upon the fact if the project were conducted without regard to the habitat needs of this federally listed species, there is potential for harm to the species by means of soil erosion from the project. Project resource protections as described will protect water quality within streams and tributaries, thus protecting the habitat for this species.

Thus, given the protection afforded by the Forest-wide and riparian standards, orange-nacre muckets and their proposed critical habitat should not be adversely impacted. However, there is potential for cumulative indirect and localized direct negative effects if steep slopes are treated with site preparation activities such as drum chopping. These areas will be site prepared by methods to prevent excessive soil loss or other measures will be taken to minimize soil erosion. It is therefore my determination that the practices which are the management actions necessary to carry out the Forest Health and Restoration Project are **not likely to adversely affect the orange-nacre mucket and may not adversely modify proposed critical habitat.**

II. B.8. Alabama moccasinshell (*Medionidus acutissimus*) Lea

II. B.8.a. Environmental Baseline – Alabama moccasinshell

The Alabama moccasinshell was federally listed as threatened in 1993 (USFWS 1993). The species historically occurred in the Alabama, Tombigbee, Black Warrior, Cahaba, Coosa River systems, and their tributaries in Alabama, Mississippi, and Georgia. The species appears to have declined or disappeared from the mainstem rivers of all basins but continues to survive in many tributary streams (USFWS 2003). Highest densities have been observed within the Sipsey Fork tributaries on the Bankhead National Forest (Warren and Haag 1994). Critical habitat has been proposed for 16 watersheds including portions within the Sipsey Fork largely on the Bankhead National Forest (USFWS 2003). Current and historical habitats on or near Bankhead National Forest are displayed in Table BA.K.

Table BA.K - Alabama moccasinshell

Overview of Alabama moccasinshell mussel occurrences and historical, potential, and proposed critical habitat within five miles of the National Forests in Alabama.

River Basin	Watersheds	Miles		Forest	Counties	Status	Viability Risk ¹		
		on	near				L	M	H
Black Warrior	Lower Brushy	13		Bankhead	Winston	present		N	
	Upper Brushy	40			Winston	present		F	
	L. Sipsey Fork	24			Winston	91mi occupied C.Hab			N
	U. Sipsey Fork	27			Winston	91mi occupied C.Hab		F	
total		104							
¹ Viability risks: L = low, M = moderate, H = high, N = minimal FS influence, F = some FS influence									

This species is found in streams and small rivers along moderate to fast flowing shoals. It inhabits the interstices of gravel and cobble substrates, remaining completely embedded in the stream bottom most of the year. The blackspotted topminnow (*Fundulus olivaceus*), Tuskaloosa darter (*Etheostoma douglasi*), redbfin darter (*E. whipplei*), blackbanded darter (*Percina nigrofasciata*), naked sand darter (*Ammocrypta beani*), southern sand darter (*A. Meridiana*), Johnny darter (*E. nigrum*), speckled darter (*E. stigmaeum*), saddleback darter (*Percina vigil*), and logperch (*P. caprodes*) have been identified as suitable fish hosts for the glochidia (Haag and Warren, 1997, 2001). Freshwater mussels are filter feeders taking organic detritus, diatoms, phytoplankton, and zooplankton from the water column. As with many other freshwater mussels, Alabama moccasinshells require clean gravel riffles and are especially susceptible to the threat of stream degradation resulting from low dissolved oxygen levels or high chlorine concentrations in waterways. Additionally, this species does not survive in impoundments and reservoirs. Other factors that can negatively impact freshwater mussels include contamination of waterways with pesticides, heavy metals, and other substances and the introduction of non-indigenous mollusks, such as the Asian clam and zebra mussel. The primary constituent elements of proposed critical habitat include: stable channels, appropriate flows, necessary water quality, clean substrates, available fish hosts, and lack of competitive nonnative species (USFWS 2003).

The decline and extirpation of most populations of Alabama moccasinshell may be attributed to habitat modification, sedimentation, eutrophication, and other forms of water quality degradation. Passage of host fish may also be a factor. The 8 known or suspected extant populations of Alabama moccasinshell probably inhabit less than half of the suitable habitat for this species within the Alabama National Forests. Recent drought conditions and existing barriers to fish passage may limit populations within the upper portions of these 8 watersheds. One population (Lower Sipsey Fork) is potentially at high risk of population decline due to reduced base flows and a downstream reservoir possibly limiting the ability of the species to re-colonize the upper watershed.

II. B.8.b. Direct, Indirect, and Cumulative Effects – Alabama moccasinshell

Alabama moccasinshells are fairly widely distributed across the Sipsey and Brushy drainages within Bankhead National Forest. They are also a species that can inhabit long reaches extending from the mainstem to tributary headwaters. For populations of Alabama moccasinshell mussels and their proposed critical habitat, potential management influences include any activity that could accelerate erosion or deposition, increase sedimentation or turbidity, alter water flow, or block host fish passage.

Excessive siltation and turbidity, which are caused by soil erosion, may affect Alabama moccasinshells by altering the rocky interstitial spaces where they live and also by reducing foraging and reproductive effectiveness. The streams where this species currently lives have a naturally occurring level of siltation and turbidity following significant precipitation events. The practices that could potentially effect this species would be those which disturb the soil and potentially result in excessive levels of soil loss. These practices include thinning operations, temporary road construction and site preparation activities.

Aquatic habitat will be protected by forest level actions to protect water quality. These actions include the use of erosion control measures on sloping areas of temporary roads, limited use of practices on areas that have potential for excessive soil erosion, recognition of equipment restrictions within existing streamside management zones and adherence to guidelines for streamside management zones. Streamside management zone guidelines which are required by the Forest Land and Resource Management Plan and its amendments and revisions will be followed on every tract. There are no known stream crossings to be constructed that are habitat to this species. Thus, direct physical damage would be prevented to this species and its habitat.

Indirect effects such as water quality degradation must be considered. There is potential for cumulative indirect and localized direct negative effects if steep slopes are treated with site preparation activities such as drum chopping. However, these areas will be site prepared by methods to prevent excessive soil loss or other measures will be taken to minimize soil erosion. Erosion control efforts will be utilized by District personnel to prevent, reduce or control erosion on temporary roads and constructed fire lines. This is addressed by employing mitigating measures. All proposed treatment sites for thinning or restorations have streamside management zones and guidelines in place, thus no indirect effects are anticipated downstream. Management activities will be limited on steep sites where excessive erosion could occur.

Forest Service activities are not likely to be of the magnitude or intensity to affect water flow. Current operations of the Lewis Smith dam and possible impacts to aquatic species are being addressed with Alabama Power Company through the Federal Energy Regulatory Commission relicensing process. However, these operations are not under Forest Service permit.

Cumulative watershed effects from off-forest sources are of concern given the interspersed of private in-holdings on some sections of proposed critical habitat. The Forest Service has no authority on private land activities. Continued habitat and watershed protection, monitoring, and restoration will be the primary recovery objectives on Forest lands. Habitat and representative populations will be monitored in conjunction with comprehensive surveys and project monitoring. Monitoring will include either search indices or transects depending on local conditions and mussel densities.

The general direction and exercise of the practices, which are part of this proposal for Forest Health and Restoration will ultimately lead to a healthy forest cover for the Bankhead National Forest. This situation will provide beneficial conditions for the watershed of this aquatic species. If the practices contained herein are implemented by utilizing standards of Forest Service procedures; the direct, indirect and cumulative effects of thinning, site preparation and implementation of practices to reach the desired future conditions, will be minimized. In this case, it is likely that any negative effects will be mitigated or minimized to a discountable and insignificant level. This will be beneficial for Alabama moccasinshells and their proposed critical habitat as compared to the baseline conditions. Furthermore, the provisions contained within the proposed draft Forest Plan provides opportunities for proactive habitat restoration and species protection through consolidation of Forest ownership, contributions to recovery and conservation, participation in population and habitat enhancements and restoration, and commitment to ongoing surveys and monitoring.

II. B.8.c. Determination of Effect – Alabama moccasinshell

The determination is “not likely to adversely affect” for Alabama moccasinshell mussels. The rationale for this decision rests upon the fact that if the project were conducted without regard to the habitat needs of this Federally listed species, there is potential for harm to the species by means of soil erosion from the project. Project resource protections as described will be utilized to protect water quality within streams and tributaries, thus protecting the habitat for this species.

Thus, given the protection afforded by the Forest-wide and riparian standards, Alabama moccasinshells and their proposed critical habitat should benefit from a healthy forest cover across the National Forest lands. It is therefore my determination that the practices and management actions necessary to carry out the Forest Health and Restoration Project are **not likely to adversely affect the Alabama moccasinshells and may not adversely modify proposed critical habitat.**

II. B.9. Coosa moccasinshell (*Medionidus parvulus*) Lea

II. B.9.a. Environmental Baseline – Coosa moccasinshell

The Coosa moccasinshell was federally listed as endangered in 1993 (USFWS 1993). The species historically occurred in the Cahaba, Sipsey Fork of the Black Warrior, Coosa River systems, and their tributaries in Alabama, Georgia, and Tennessee. Currently, the species may be extirpated from the Cahaba and Black Warrior River basins. Since listing, the species has only been documented in the Conasauga River of the upper Coosa River Basin (USFWS 2003). Critical habitat has been proposed on 9 watersheds of Alabama, Georgia, and Tennessee. This critical habitat does not include any portions of the streams within Bankhead National Forest (USFWS 2003). This species is included within this analysis primarily due to its status as having historical habitat within the Black Warrior basin and that it is a high profile species proposed for critical habitat designation in other areas. Historical, potential, and proposed critical habitats on or near National Forests are displayed in Table BA.L

Table BA.L - Coosa moccasinshell

Overview of Coosa moccasinshell historical, potential, and proposed critical habitat within five miles of the National Forests in Alabama.

River Basin	Watersheds	Miles		Forest	Counties	Status	Viability Risk ¹		
		on	near				L	M	H
Black Warrior	L. Sipsey Fork	24		Bankhead	Winston	historical			N
	U. Sipsey Fork	27			Lawrence	historical		F	
Total		119							

¹Viability risks: L = low, M = moderate, H = high, N = minimal FS influence, F = some FS influence

This species inhabits the interstices of gravel and cobble in flowing shoals of streams and small rivers. The Coosa moccasinshell is usually completely buried in the stream bottom (USFWS 2003). Gravid females are thought to migrate to the surface during spring for release of their larval glochidia. They are known to utilize darters as glochidial hosts and other species may also be used (USFWS 2003). Freshwater mussels are filter feeders taking organic detritus, diatoms, phytoplankton, and zooplankton from the water column. The Coosa moccasinshell requires clean gravel riffles and are especially susceptible to stream degradation resulting from low dissolved oxygen levels or high chlorine concentrations in waterways. Additionally, this species does not survive in impoundments and reservoirs. Other factors that can negatively impact freshwater mussels include contamination of waterways with pesticides, heavy metals and other substances and the introduction of non-indigenous mollusks, such as the Asian clam and zebra mussel. The primary constituent elements of proposed critical habitat include: stable channels, appropriate flows, necessary water quality, clean substrates, available fish hosts, and lack of competitive nonnative species (USFWS 2003).

The decline and extirpation of most populations of Coosa moccasinshells may be attributed to habitat modification, sedimentation, eutrophication, and other forms of water quality degradation. Passage of host fish may also be a factor. The 5 known or suspected extant populations of Coosa moccasinshell mussels probably inhabit only a small fraction of the suitable habitat remaining for this species within the Alabama National Forests and none is known from Bankhead National

Forest. Recent drought conditions and existing barriers to fish passage, such as the presence of numerous reservoirs, may limit populations within the upper portions of these watersheds. One population (Lower Sipsey Fork) is potentially at risk of population decline due to factors beyond the influence of the National Forests, such as reduced base flows, periodic inundation, and habitat fragmentation from a reservoir located downstream.

II. B.9.b. Direct, Indirect, and Cumulative Effects – Coosa moccasinshell

For populations of Coosa moccasinshell mussels and their proposed critical habitat on or near National Forests, potential management influences include any activity that could accelerate erosion or deposition, increase sedimentation or turbidity, alter water flow or chemistry, favor the spread of invasive species, or block host fish passage.

Siltation and turbidity may affect Coosa moccasinshells by altering the rocky interstitial spaces where they live and also by reducing foraging and reproductive effectiveness. While there is a background level of natural silt movement within the streams, if an action causes soil erosion it produces un-naturally high amounts that may cause resource damage. Under the proposed Forest Health and Restoration Project, the Forest-wide streamside management zone and additional riparian standards will improve conditions within the historical habitat for the Coosa moccasinshell and minimize or alleviate impacts to proposed critical habitat by preventing sediment released during management activities.

Forest Service activities are not likely to be of the magnitude or intensity to affect water flow. Current operations of the Lewis Smith dam and possible impacts to aquatic species are being addressed with Alabama Power Company through the Federal Energy Regulatory Commission relicensing process. However, these operations are not under Forest Service permit.

Cumulative watershed effects from off-forest sources are of concern given the interspersed of private in-holdings on some sections of proposed critical habitat as the Forest Service has no authority on private land activities. Continued habitat and watershed protection, monitoring, and restoration will be the primary recovery objectives on Forest lands. Habitat and representative populations will be monitored in conjunction with comprehensive surveys and project monitoring. Monitoring will include either search indices or transects depending on local conditions and mussel densities.

The general direction and exercise of the practices, which are part of this proposal for Forest Health and Restoration, will ultimately lead to a healthy forest cover for the Bankhead National Forest. This situation will provide beneficial conditions for the watershed of this aquatic species. If the practices contained herein are implemented by utilizing standards of Forest Service procedures; the direct, indirect and cumulative effects of thinning, site preparation and implementation of practices to reach the desired future conditions, will be minimized. In this case, it is likely that any negative effects will be mitigated or minimized to a discountable and insignificant level. This will be beneficial for historical habitat of the Coosa moccasinshell and their proposed critical habitat as compared to the baseline conditions. Furthermore, the provisions contained within the proposed (although currently in DRAFT format) Forest Plan provides opportunities for proactive habitat restoration and species protection through consolidation of Forest ownership, contributions to recovery and conservation, participation in population and habitat enhancements and restoration, and commitment to ongoing surveys and monitoring.

II. B.9.c. Determination of Effect – Coosa moccasinshell

The determination is “not likely to adversely affect” for Coosa moccasinshell mussels. The rationale for this decision rests upon the fact if the project were conducted without regard to the habitat needs of this federally listed species, there is potential for harm to the species by means of

soil erosion from the project. Project resource protections as described will be utilized to protect water quality within streams and tributaries, thus protecting the habitat for this species.

Thus, given the protection afforded by the Forest-wide and riparian standards, historical habitat of the Coosa moccasinshells and their proposed critical habitat should benefit from a healthy forest cover across the National Forest lands. It is therefore my determination that the practices and management actions necessary to carry out the Forest Health and Restoration Project are **not likely to adversely affect the Coosa moccasinshells and may not adversely modify proposed critical habitat.**

II. B.10. Dark pigtoe (*Pleuorbema furvum*)

II. B.10.a. Environmental Baseline – Dark pigtoe

The dark pigtoe was federally listed as endangered in 1993 (USFWS 1993). The species historically was restricted to the Black Warrior River basin above the fall line (USFWS 2003). Since listing, it has been confirmed in the Sipsey Fork and its tributaries including Caney creek and tributaries of upper Brushy such as Brown, Capsey and Rush creeks (USFWS 2003). Highest population densities have also been recorded in these areas (Warren and Haag 1994). Critical habitat has been proposed including areas within the Sipsey Fork, largely on the Bankhead National Forest (USFWS 2003).

Table BA.M - Dark pigtoe

Overview of known or suspected dark pigtoe mussel historical, potential, and proposed critical habitat within five miles of the National Forests in Alabama.

River Basin	Watersheds	Miles		Forest	Counties	Population status	Viability Risk ¹		
		on	near				L	M	H
Black Warrior	Clear	11		Bankhead	Winston	unlikely			N
	Lower Brushy	13			Winston	present		N	
	L. Sipsey Fork	24			Winston	91mi occupied C.Hab			N
	Upper Brushy	40			Winston	present		F	
	U. Sipsey Fork	27			Winston	present		F	
Total		115							
¹ Viability risks: L = low, M = moderate, H = high, N = minimal FS influence, F = some FS influence									

This species is found in sand, gravel, and cobble shoals and runs in small rivers and large streams. This species is gravid in June and releases glochidia in peach to pink colored conglutinates (Haag and Warren 1997). Fish hosts have been identified as the largescale stoneroller (*Campostoma oligolepis*), Alabama shiner, blacktail shiner, creek chub (*Semotilus*

atromaculatus), and blackspotted topminnow (Haag and Warren 1997). Freshwater mussels are filter feeders taking organic detritus, diatoms, phytoplankton, and zooplankton from the water column.

The decline and extirpation of most populations of dark pigtoe mussels may be attributed to habitat modification, sedimentation, eutrophication, and other forms of water quality degradation. Mussels such as the dark pigtoe require clean gravel riffles and are especially susceptible to stream degradation resulting from low dissolved oxygen levels or high chlorine concentrations in waterways. This species does not survive in impoundments and reservoirs. Other factors that can negatively impact freshwater mussels include contamination of waterways with pesticides, heavy metals, and other substances and the introduction of non-indigenous mollusks, such as the Asian clam and zebra mussel. The primary constituent elements of proposed critical habitat include: stable channels, appropriate flows, necessary water quality, clean substrates, available fish hosts, and lack of competitive nonnative species (USFWS 2003).

II. B.10.b. Direct, Indirect, and Cumulative Effects -- Dark pigtoe

Dark pigtoes are limited to the Bankhead National Forest. For populations of dark pigtoe mussels and their proposed critical habitat on or near National Forests, potential management influences include any activity that could accelerate erosion or deposition, increase sedimentation or turbidity, alter water flow or chemistry, favor the spread of invasive species, or block host fish passage.

Excessive siltation and turbidity, which are caused by soil erosion may affect dark pigtoe mussels by altering the rocky interstitial spaces where they live and also by reducing foraging and reproductive effectiveness. The streams where this species currently lives have a naturally occurring level of siltation and turbidity following significant precipitation events. The practices that could potentially effect this species would be those which disturb the soil and potentially result in excessive levels of soil loss. These practices include thinning operations, temporary road construction and site preparation activities.

Aquatic habitat will be protected by forest level actions to protect water quality. These actions include the use of erosion control measures on sloping areas of temporary roads, limited use of practices on areas that have potential for excessive soil erosion, recognition of equipment restrictions within existing streamside management zones and adherence to guidelines for streamside management zones. Streamside management zone guidelines, which are required by the Forest Land and Resource Management Plan and its amendments and revisions will be followed on every tract. There are no known stream crossings to be constructed that are habitat to this species. Thus, direct physical damage would be prevented to this species and its habitat.

Indirect effects such as water quality degradation should be considered. There is potential for cumulative indirect and localized direct negative effects if steep slopes are treated with site preparation activities such as drum chopping. However, these areas will be site prepared by methods to prevent excessive soil loss or other measures will be taken to minimize soil erosion. Erosion control efforts will be utilized by District personnel to prevent, reduce or control erosion on temporary roads and constructed fire lines. This is addressed by employing mitigating measures. All proposed treatment sites for thinning or restorations have streamside management zones and guidelines in place, thus no indirect effects are anticipated downstream. Management activities will be limited on steep sites where excessive erosion could occur.

Current operations of the Lewis Smith Dam and possible impacts to aquatic species are being addressed with Alabama Power Company through the Federal Energy Regulatory Commission (FERC) relicensing process. However, these operations are not under Forest Service permit.

Cumulative watershed effects from off-forest sources are of concern given the interspersed of private in-holdings on some sections of proposed critical habitat as the Forest Service has no

authority on private land activities. Continued habitat and watershed protection, monitoring, and restoration will be the primary recovery objectives on Forest lands. Habitat and representative populations will be monitored in conjunction with comprehensive surveys and project monitoring. Monitoring will include either search indices or transects depending on local conditions and mussel densities.

The general direction and exercise of the practices, which are part of this proposal for Forest Health and Restoration will ultimately lead to a healthy forest cover for the Bankhead National Forest. This situation will provide beneficial conditions for the watershed of this aquatic species. If the practices contained herein are implemented by utilizing standards of Forest Service procedures; the direct, indirect and cumulative effects of thinning, site preparation and implementation of practices to reach the desired future conditions, will be minimized. In this case, it is likely that any negative effects will be mitigated or minimized to a discountable and insignificant level. This will be beneficial for dark pigtoe mussels and their proposed critical habitat as compared to the baseline conditions. Furthermore, the provisions contained within the proposed (although currently in Draft format) Forest Plan provides opportunities for proactive habitat restoration and species protection through consolidation of Forest ownership, contributions to recovery and conservation, participation in population and habitat enhancements and restoration, and commitment to ongoing surveys and monitoring.

II. B.10.c. Determination of Effect – Dark Pigtoe

The determination is “not likely to adversely affect” for dark pigtoe mussels. The rationale for this decision rests upon the fact if the project were conducted without regard to the habitat needs of this federally listed species, there is potential for harm to the species by means of soil erosion from the project. Project resource protections as described will be utilized to protect water quality within streams and tributaries, thus protecting the habitat for this species.

Thus, given the protection afforded by the Forest-wide and riparian standards, dark pigtoe mussels and their proposed critical habitat should benefit from a healthy forest cover across the National Forest lands. It is therefore my determination that the practices and management actions necessary to carry out the Forest Health and Restoration Project are **not likely to adversely affect the dark pigtoe mussels and may not adversely modify proposed critical habitat.**

II. B.11. Ovate clubshell (*Pleurobema perovatum*) Lea

II. B.11.a. Environmental Baseline – Ovate clubshell

The ovate clubshell was federally listed as endangered in 1993 (USFWS 1993). The species historically occurred in the Tombigbee, Black Warrior, Alabama, Cahaba, Tallapoosa and Coosa Rivers, and their tributaries in Mississippi, Alabama, and Georgia. Apparently, the species is extirpated from the Black Warrior, Cahaba, and Alabama River basins and it may no longer survive in the mainstem Tombigbee River and Uphabee and Opintlocco Creeks (USFWS 2003). Critical habitat has been proposed for 20 watersheds in Alabama, Mississippi, Georgia, and Tennessee (USFWS 2003). Portions of proposed critical habitat are within Uphabee and Chewacla Creeks on the Tuskegee National Forest, Terrapin Creek on the Shoal Creek District of the Talladega National Forest, Hatchet Creek downstream of the Talladega District, Sipsey Fork largely on the Bankhead National Forest, and the Cahaba River upstream from the Oakmulgee Division of the Talladega National Forest. It is not currently known to exist within Bankhead National Forest although it historically had habitat in this area. Historical, potential, and proposed critical habitats on or near National Forests are displayed in Table BA.N.

Table BA.N - Ovate clubshell

Overview of known or suspected ovate clubshell mussel historical, potential and proposed critical habitat within five miles of the National Forests in Alabama.

River Basin	Watersheds	Miles		Forest	Counties	Status	Viability Risk ²		
		on	near				L	M	H
Black Warrior	Lower Brushy	13		Bankhead	Winston	extirpated?			
	Upper Brushy	40				extirpated?		F	
	U. Sipsey Fork	27				unoccupied C.Hab		F	
Total		80							

¹Viability risks: L = low, M = moderate, H = high, N = minimal FS influence, F = some FS influence

This species utilizes habitat consisting of sand and gravel shoals and runs in large streams and small rivers. Gravid females are observed from June through July and glochidia are released as well formed white conglomerates (USFWS 2003). Host fish are unknown for this species. Freshwater mussels are filter feeders taking organic detritus, diatoms, phytoplankton, and zooplankton from the water column. The ovate clubshell utilizes stable sediments and requires clean gravel riffles and are especially susceptible to stream degradation resulting from low dissolved oxygen levels or high chlorine concentrations in waterways. Additionally, this species does not survive in impoundments and reservoirs. Other factors that can negatively impact freshwater mussels include contamination of waterways with pesticides, heavy metals, and other substances and the introduction of non-indigenous mollusks, such as the Asian clam and zebra mussel (*Dreissena polymorpha*). The primary constituent elements of proposed critical habitat include: stable channels, appropriate flows, necessary water quality, clean substrates, available fish hosts, and lack of competitive nonnative species (USFWS 2003).

The decline and extirpation of most populations of ovate clubshells may be attributed to habitat modification, sedimentation, eutrophication, and other forms of water quality degradation. Passage of host fish may also be a factor. The known or suspected extant populations of ovate clubshell mussels probably inhabit only a small fraction of the suitable habitat remaining for this species within the National Forests in Alabama and none is known from Bankhead National Forest. Recent drought conditions and existing barriers to fish passage, such as the presence of numerous reservoirs, may limit populations within the upper portions of these watersheds. One population (Upper Sipsey Fork) is potentially at risk of population decline due to factors beyond the influence of the National Forests, such as reduced base flows, and a downstream reservoir making it difficult for the species to re-colonize the upper watershed.

II. B.11.b. Direct, Indirect, and Cumulative Effects – Ovate Clubshell

For populations of ovate clubshell mussels and their proposed critical habitat on or near National Forests, potential management influences include any activity that could accelerate erosion or deposition, increase sedimentation or turbidity, alter water flow or chemistry, favor the spread of invasive species, or block host fish passage.

Siltation and turbidity may affect ovate clubshell by altering the rocky interstitial spaces where they live and also by reducing foraging and reproductive effectiveness. While there is a

background level of natural silt movement within the streams, if an action causes soil erosion it produces un-naturally high amounts that may cause resource damage. Under the proposed Forest Health and Restoration Project, the Forest-wide, streamside management zone and additional riparian standards will improve conditions within the historical habitat for the ovate clubshell and minimize or alleviate impacts to proposed critical habitat by preventing sediment released during management activities. Forest Service activities are not likely to be of the magnitude or intensity to affect water flow.

Forest Service activities are not likely to be of the magnitude or intensity to affect water flow. Current operations of the Lewis Smith Dam and possible impacts to aquatic species are being addressed with Alabama Power Company through the Federal Energy Regulatory Commission relicensing process. However, these operations are not under Forest Service permit.

Cumulative watershed effects from off-forest sources are of concern given the interspersed of private in-holdings on some sections of proposed critical habitat as the Forest Service has no authority on private land activities. Continued habitat and watershed protection, monitoring, and restoration will be the primary recovery objectives on Forest lands. Habitat and representative populations will be monitored in conjunction with comprehensive surveys and project monitoring. Monitoring will include either search indices or transects depending on local conditions and mussel densities.

The general direction and exercise of the practices, which are part of this proposal for Forest Health and Restoration will ultimately lead to a healthy forest cover for the Bankhead National Forest. This situation will provide beneficial conditions for the watershed of this aquatic species. If the practices contained herein are implemented by utilizing standards of Forest Service procedures; the direct, indirect and cumulative effects of thinning, site preparation and implementation of practices to reach the desired future conditions, will be minimized. In this case, it is likely that any negative effects will be mitigated or minimized to a discountable and insignificant level. This will be beneficial for historical habitat of the ovate clubshell and their proposed critical habitat as compared to the baseline conditions. Furthermore, the provisions contained within the proposed (although currently in Draft format) Forest Plan provides opportunities for proactive habitat restoration and species protection through consolidation of Forest ownership, contributions to recovery and conservation, participation in population and habitat enhancements and restoration, and commitment to ongoing surveys and monitoring.

II. B.11.c. Determination of Effect – Ovate Clubshell

The determination is “not likely to adversely affect” for ovate clubshell mussel. The rationale for this decision rests upon the fact if the project were conducted without regard to the habitat needs of this Federally listed species, there is potential for harm to the species by means of soil erosion from the project. Project resource protections as described will be utilized to protect water quality within streams and tributaries, thus protecting the habitat for this species.

Thus, given the protection afforded by the Forest-wide and riparian standards, historical habitat of the ovate clubshells and their proposed critical habitat should benefit from a healthy forest cover across the National Forest lands. It is therefore my determination that the practices and management actions necessary to carry out the Forest Health and Restoration Project are **not likely to adversely affect the ovate clubshells and may not adversely modify proposed critical habitat.**

II. B.12. Triangular kidneyshell (*Ptychobranhus greeni*) Conrad

II. B.12.a. Environmental Baseline -- Triangular kidneyshell

The triangular kidneyshell was federally listed as endangered in 1993 (USFWS 1993). The species historically occurred in the Black Warrior, Cahaba, Alabama, and Coosa River systems, and their tributaries in Alabama, Georgia, and Tennessee. The species may be extirpated from

the Alabama River and may no longer inhabit the mainstems of the Black Warrior and Coosa Rivers (USFWS 2003). Critical habitat has been proposed for 13 watersheds in Alabama, Georgia, and Tennessee (USFWS 2003). Portions of proposed critical habitat are within the Sipsey Fork largely on the Bankhead National Forest. Historical, potential, and proposed critical habitats on or near National Forests are displayed in Table BA.O.

Table BA.O - Triangular kidneyshell

Overview of known or suspected triangular kidneyshell mussel historical, potential, and proposed critical habitat within five miles of the National Forests in Alabama.

River Basin	Watersheds	Miles		Forest	Counties	Population Status	Viability Risk ¹		
		on	near				L	M	H
Black Warrior	L. Sipsey Fork	24		Bankhead	Winston	91mi occupied C.Hab			N
	U. Sipsey Fork	27			Lawrence	91mi occupied C.Hab		F	
	Upper Brushy	40			Winston	present		F	
Total		91							
¹ Viability risks: L = low, M = moderate, H = high, N = minimal FS influence, F = some FS influence									

This species is found in areas with rapid currents over shoals and riffles in large streams and small rivers. Larval glochidia are released from March through April as conglomerates that mimic dipteran larvae (Hartfield and Hartfield 1996) or fish eggs (Haag and Warren 1997) and serve to attract potential host fish. The Warrior darter (*Etheostoma bellator*), Tuscaloosa darter, blackbanded darter, and logperch have been identified as suitable fish hosts for the glochidia (Haag and Warren 1997). Freshwater mussels are filter feeders taking organic detritus, diatoms, phytoplankton, and zooplankton from the water column. This species requires clean gravel riffles and are especially susceptible to stream degradation resulting from low dissolved oxygen levels or high chlorine concentrations in waterways. As with many other freshwater mussels, the triangular kidneyshell does not survive impoundments and reservoirs. Other factors that can negatively impact freshwater mussels include contamination of waterways with pesticides, heavy metals, and other substances and the introduction of nonindigenous mollusks, such as the Asian clam and zebra mussel. The primary constituent elements of proposed critical habitat include: stable channels, appropriate flows, necessary water quality, clean substrates, available fish hosts, and lack of competitive nonnative species (USFWS 2003).

The decline and extirpation of most populations of triangular kidneyshell may be attributed to habitat modification, sedimentation, eutrophication, and other forms of water quality degradation. Passage of host fish may also be a factor. The 7 known or suspected extant populations of triangular kidneyshell probably inhabit less than half of the suitable habitat for this species within the National Forests in Alabama. Recent drought conditions and existing barriers to fish passage may further limit populations within the upper portions of these watersheds. Currently, 2 of 7

known or suspected populations associated with the National Forests in Alabama are considered at high risk based upon analysis of potential watershed conditions

II. B.12.b. Direct, Indirect, and Cumulative Effects – Triangular kidneyshell

Triangular kidneyshells are fairly widely distributed across Sipsey Fork and Brushy Creek of the Bankhead National Forest. They are also a species that can inhabit long reaches extending from the mainstem to tributary headwaters. Consequently, the potential affects of Forest Service management activities are much broader than for species that have a smaller zone of habitat. For populations of triangular kidneyshell mussels and their proposed critical habitat on or near National Forests, potential management influences include any activity that could accelerate erosion or deposition, increase sedimentation or turbidity, alter water flow or chemistry, favor the spread of invasive species, or block host fish passage.

Excessive siltation and turbidity, which are caused by soil erosion may affect triangular kidneyshells by altering the rocky interstitial spaces where they live and also by reducing foraging and reproductive effectiveness. The streams where this species currently lives have a naturally occurring level of siltation and turbidity following significant precipitation events. The practices that could potentially effect this species would be those which disturb the soil and potentially result in excessive levels of soil loss. These practices include thinning operations, temporary road construction and site preparation activities.

Aquatic habitat will be protected by forest level actions to protect water quality. These actions include the use of erosion control measures on sloping areas of temporary roads, limited use of practices on areas that have potential for excessive soil erosion, recognition of equipment restrictions within existing streamside management zones and adherence to guidelines for streamside management zones. Streamside management zone guidelines, which are required by the Forest Land and Resource Management Plan and its amendments and revisions, will be followed on every tract. There are no known stream crossings to be constructed that are habitat to this species. Thus, direct physical damage would be prevented to this species and its habitat.

Indirect effects such as water quality degradation should be considered. There is potential for cumulative indirect and localized direct negative effects if steep slopes are treated with site preparation activities such as drum chopping. However, these areas will be site prepared by methods to prevent excessive soil loss or other measures will be taken to minimize soil erosion. Erosion control efforts will be utilized by District personnel to prevent, reduce or control erosion on temporary roads and constructed fire lines. This is addressed by employing mitigating measures. All proposed treatment sites for thinning or restoration practices have streamside management zones and guidelines in place, thus no indirect effects are anticipated downstream. Management activities will be limited on steep sites where excessive erosion could occur.

Forest Service activities are not likely to be of the magnitude or intensity to affect water flow. Current operations of the Lewis Smith dam and possible impacts to aquatic species are being addressed with Alabama Power Company through the Federal Energy Regulatory Commission relicensing process. However, these operations are not under Forest Service permit.

Cumulative watershed effects from off-forest sources are of concern given the interspersed of private in-holdings on some sections of proposed critical habitat as the Forest Service has no authority on private land activities. Continued habitat and watershed protection, monitoring, and restoration will be the primary recovery objectives on Forest lands. Habitat and representative populations will be monitored in conjunction with comprehensive surveys and project monitoring. Monitoring will include either search indices or transects depending on local conditions and mussel densities.

The general direction and exercise of the practices, which are part of this proposal for Forest Health and Restoration, will ultimately lead to a healthy forest cover for the Bankhead National

Forest. This situation will provide beneficial conditions for the watershed of this aquatic species. If the practices contained herein are implemented by utilizing standards of Forest Service procedures; the direct, indirect and cumulative effects of thinning, site preparation and implementation of practices to reach the desired future conditions, will be minimized. In this case, it is likely that any negative effects will be mitigated or minimized to a discountable and insignificant level. This will be beneficial for triangular kidneyshells and their proposed critical habitat as compared to the baseline conditions. Furthermore, the provisions contained within the proposed (although currently in Draft format) Forest Plan provides opportunities for proactive habitat restoration and species protection through consolidation of Forest ownership, contributions to recovery and conservation, participation in population and habitat enhancements and restoration, and commitment to ongoing surveys and monitoring.

II. B.12.c. Determination of Effect – Triangular Kidneyshell

The determination is “not likely to adversely affect” for triangular kidneyshell mussels. The rationale for this decision rests upon the fact if the project were conducted without regard to the habitat needs of this Federally listed species, there is potential for harm to the species by means of soil erosion from the project. Project resource protections as described will be utilized to protect water quality within streams and tributaries, thus protecting the habitat for this species.

Thus, given the protection afforded by the Forest-wide and riparian standards, triangular kidneyshells and their proposed critical habitat should benefit from a healthy forest cover across the National Forest lands. It is therefore my determination that the practices and management actions necessary to carry out the Forest Health and Restoration Project are **not likely to adversely affect the triangular kidneyshells and may not adversely modify proposed critical habitat.**

Scientific Name	Common Name	Determination of Effects
Necturus alabamensis	Black Warrior waterdog (Candidate species)	Not likely to adversely affect
Sternotherus depressus	Flattened musk turtle	Not likely to adversely affect
Epioblasma brevidens	Cumberlandian combshell	Not likely to adversely affect
Epioblasma metastriata	Upland combshell	Not likely to adversely affect
Lampsilis altilis	Fine-lined pocketbook	Not likely to adversely affect
Lampsilis perovalis	Orange-nacre mucket	Not likely to adversely affect
Medionidus acutissimus	Alabama moccasinshell	Not likely to adversely affect
Medionidus parvulus	Coosa moccasinshell	Not likely to adversely affect
Pleurobema dicisum	Southern clubshell	Not likely to adversely affect

Scientific Name	Common Name	Determination of Effects
<i>Pleurobema furvum</i>	Dark pigtoe	Not likely to adversely affect
<i>Pleurobema perovatum</i>	Ovate clubshell	Not likely to adversely affect
<i>Ptychobranhus greeni</i>	Triangular kidneyshell	Not likely to adversely affect

Table BA.P - Determination of Effects for Federally Listed Aquatic Animals

II. C. FEDERALLY LISTED PLANTS

- Leafy prairie clover (*Dalea foliosa*) – E
- Eggert's sunflower (*Helianthus eggertii*) – T
- Fleshy-fruit gladebush (*Leavenworthia crassa*) – C
- Lyrate bladder-pod (*Lesquerella lyrata*) - T
- Mohr's Barbara's buttons (*Marshallia mohrii*) – T
- White fringeless orchid (*Platanthera integrilabia*) - C
- Kral's water-plantain (*Sagittaria secundifolia*) - T
- Alabama streak-sorus fern (*Thelypteris pilosa* var *alabamense*) – T
- Tennessee yellow-eyed grass (*Xyris tennesseensis*) – E

T&E Plants Introduction

The Bankhead National Forest has seven T&E and two candidate species of plants on or near National Forest lands. This places the National Forest lands as an important refugium for many habitats and federally listed species.

All of the species listed above are rare throughout their range. The federal listing and candidate status of these species is primarily a result of their apparent limited distribution and the fragile nature of the habitats upon which they depend. Even though suitable habitat has been found to occur on National Forests in Alabama lands, it is rarely occupied by these T&E or Candidate species. Habitat loss through land conversion and development remain the principle reasons cited by all sources as contributing to a trend toward listing or keeping these species federally listed. Additional impacts include modification of habitat, loss of fire in the ecosystem, changes in hydrological function, changes in landform, building of dams, invasion of non-native plant species and over-collection or poaching from wild populations.

Many of these federally listed and candidate species occur within rare communities. Several standards for rare communities will ensure their maintenance and restoration across the landscape. Rare communities would be protected from detrimental effects caused by management actions across all alternatives. Rare communities have been inventoried in proposed project areas when projects are being proposed which have the potential to adversely affect them. Because of these standards, most federally listed species will have additional protection and restoration mandates.

Based on several of the plants' dependence on wetland habitat these species could be positively managed by protecting sites from encroachment by woody shrub species, leaving a partial or thinned overstory canopy in place and ensuring that activities taking place in areas where the plant occurs do not adversely affect the hydrology of the site (Moffett 2002). Management options would include thinning based on site-specific recommendations and burning. Total canopy removal is not recommended for most species (Moffett 2002).

Disturbance in the form of mechanical soil disturbance, compaction, rutting and activities that could alter the hydrology or landform of the populations sites, habitat or potential suitable sites are activities that could result in impact to these plants. Plants may be impacted by drought, and competition with successional vegetation or invasive non-native species.

Management issues specific to many of the above-listed species include:

- Thinning and maintenance of frequent disturbance as necessary to encourage dominance of grasses and other herbaceous species in the understory of adjacent stands;
- Encouraging spread of populations that occur on rights-of-way into adjacent stands.

T&E Plants Summary of Effects

The combination of site specific surveys, forest-wide standards and site specific mitigations as described previously afford very good protection to the federally listed species populations and habitats from potential negative effects due to proposed forest management activities. Despite this, some species may have some inherent biological limitations that could continue to pose risks to long-term viability, especially at sites where population numbers are low. Based upon this, it is apparent that while Forest Service conservation actions may contribute to improve rangewide viability, they cannot in all cases, maintain it.

Under the Forest Health and Restoration Project the integrity of these sites will be protected in all alternatives by adherence to the standards listed in the Forest Land and Resource Management Plan its amendments and subsequent revisions. In some cases, such as restoration efforts or reintroduction of species, the Bankhead National Forest can play a positive role in recovery that will result in positive impacts. Because these federally listed and candidate species are protected under the Endangered Species Act, no activities with potential to affect areas where the plants are found can take place in the sites without concurrence from, or consultation with the Fish and Wildlife Service.

Therefore, under all alternatives, the current Endangered Species Act and the current Forest Service Manual and Handbook regulations will continue to ensure that habitat and populations of T&E and candidate species will be protected and conserved. Additionally, pre-project surveys were conducted and post-project monitoring will be conducted in all areas within close proximity to known or potential habitat for the species to ensure that secondary effects do not alter the integrity of sites. Therefore, a no net loss policy will continue to remain in effect for the life of this current forest plan.

As previously stated, the Bankhead National Forest will continue to play a critical role as refugia for federally threatened and endangered species. Inherent biological limitations based upon population dynamics may continue to pose risks to the species long-term viability, especially at small sites. Potential impacts to individuals remain at all sites through plant poaching. As conversion and habitat modifications continue on private lands, it is to be expected that more species and critical habitat will be lost. As a result, the role for protection and restoration of these federally listed species on the Bankhead National Forest will continue to become more critical over time. Surveys will continue to be conducted to inventory for federally listed and candidate species and suitable habitat, and monitoring of known sites will continue.

Because rare plants often receive little or no protection on private land, and are often not well inventoried, public land plays a critical role in their conservation. Cumulatively, therefore, persistence of these species in the area of the National Forest, as well as across their ranges, will be greatly enhanced from efforts on the National Forest to maintain, manage and expand populations.

Project level inventories were conducted to gather information on the presence or absence of protected species (federally listed, Forest Service sensitive and locally rare) within the area affected by the project. All loblolly pine stands with project activities planned were evaluated.

Biological surveys have been completed for 100% of loblolly pine stands between the ages of 21 and 45 years, which are planned to be treated by an activity that causes ground disturbance. This includes thinning of pine stands and the site preparation activities, such as drum chopping and site preparation burning, which will be required for restoration treatments.

In addition, survey methodology called for sampling of sites comprised of loblolly pine plantations which are between 15 and 20 years of age. These loblolly stands are at the age where a majority of the shrub and herbaceous understory is absent. This is due to the thick and bushy growth of pine trees at this age, which prevents sunlight from reaching the forest floor, effectively reducing the development of an understory. Based upon experience and field reviews conducted on Bankhead National Forest, these stands were determined by the Forest Botanist and the Bankhead District Wildlife Biologist as the stands with the lowest likelihood for occurrence for protected species. Field surveys were performed on 48% of the acreage of these sites. Consistent with the biologist's recommendation, no federally listed or Forest Service sensitive species were found during surveys. However, a small percentage of the sites were found to have some of the locally rare species within or adjacent to the stand (Blue Ridge trillium, silky camellia, small head gayflower, pinesap, little leaf alum root and Nestronia). Due to the fact that this is a higher than anticipated incidence of occurrence, additional monitoring will be conducted on these 15 to 20 year old loblolly plantations prior to implementation of the project. If additional locally rare species are discovered on these sites, they will be recorded and protected as required.

II. C. 1. Leafy Prairie-Clover (*Dalea foliosa*)

II. C. 1. a. Environmental Baseline

The leafy prairie-clover was federally listed as **endangered** in 1991. This species typically prefers thin-soiled limestone or dolomite glades and limestone barrens. The plant may also be found on wet calcareous barrens and moist prairies or cedar glades, usually near a stream or seepage from limestone that provides seasonal moisture. *Sabatia angularis* and *Rudbeckia triloba* are associates of this species. The plant requires full sun and high competition from other plant species may interfere with the plants ability to reproduce (NatureServe Explorer 2001).

The leafy prairie-clover is a stout perennial herb, 4 - 7 dm tall. The plant has no hair except on the inflorescence. Leaflets of primary leaves are 4 – 10 mm long, flat or loosely folded. Several stems rise out of a hardened root crown. Flower spikes are small, purple and dense. The plant flowers from late July to early August, but may also bloom sporadically into September (Isely 1990).

This species occurs in Tennessee, Alabama, and Illinois. There are 44 occurrences in Tennessee, however, only 17 populations are considered to be marginal or better. Illinois has three known occurrences and there are four different populations in Alabama. In Tennessee and Alabama, the plant tends to be found mainly on open limestone glades and in Tennessee, it may also be found growing on wet calcareous barrens and moist prairies. In Illinois, the plant seems restricted to thin-soiled, wet or moist, open dolomite prairies and on river terraces in the northeastern part of the state (NatureServe Explorer 2001).

Decline of the leafy prairie-clover may be attributed for the most part to habitat destruction and alteration caused by commercial and industrial development, overgrazing, and fire suppression. The species is also greatly threatened by encroachment of exotic species, especially exotic shrub species, particularly privet (*Ligustrum sinense*) and Eurasian bush honeysuckle (*Lonicera maackii*). Fire suppression resulting in succession of other woody vegetation also threatens the populations of the leafy prairie-clover. This species is short-lived and does not spread therefore; population survival is dependent on seed production. Natural communities containing the leafy prairie-clover need to be subjected to periodic prescribed burning to help build a persistent seed bank (NatureServe Explorer 2001).

The species appears to maintain itself only in areas that are naturally or artificially cleared and where hardwood and understory shrubs are at low densities. In Alabama, the majority of the populations are found on cedar glades.

II. C. 1. b. Direct, Indirect, and Cumulative Effects – Leafy prairie clover

All cedar glade communities, habitat for leafy prairie-clover, would be managed in such a manner as to provide protection to any rare plants that may occur there. Several standards for rare communities ensure their maintenance and restoration across the landscape. Rare communities would be protected from detrimental effects caused by management actions across all alternatives. Rare communities have been inventoried in proposed project areas where actions are proposed, which have the potential to adversely affect them. Since federally listed plants receive little or no legal protection on private land, these species may be vulnerable to extirpation.

This plant was not found on any tract by any of the surveys conducted for this project. Since no populations are known to occur on National Forest land, the direct and cumulative effects of National Forest planning alternatives on this plant are likely to be negligible.

II. C. 1. c. Determination of Effect – Leafy prairie clover

Through implementation of the Forest-wide, Rare Community, T&E species and Riparian Standards, the selection of any of the alternatives will have **No Effect** on leafy prairie-clover.

II. C. 2. Eggert's Sunflower (*Helianthus eggertii*)

II. C. 2. a. Environmental Baseline

This plant lives in open oak/pine woodlands and grasslands and was federally listed as threatened in 1997 (USFWS 1997). It blooms in July and August, with flowers (actually composite heads of many small flowers) that are relatively large being about 3.5 inches in diameter, its stem is smooth and waxy, and the tapering leaves with rounded bases are smooth except for a scattered roughness on the upper surface (Pyne, 1998).

The habitat has been described as rocky hills, barrens or open upland oak-pine woods. Soils can be sands, clays, chert or gravel or open upland woods (Kral 1983). The open wood habitats are often dominated by oak forests, specifically white oak, black oak and southern red oaks, as well as hickories and pines. The barrens are openings dominated by perennial grasses and herbs (Jones 1994).

It prefers a habitat type which was presumably more widespread when fire was a more common event in the landscape. This grass and herb-dominated habitat type is grasslands, woodlands and barrens, and is related to the prairies of the Midwest, both in structure, species composition, and ecology (Pyne, 1998). Eggert's sunflower is thought to be a relict species of the fire-dependent barrens habitats, sustained by lightning fires and aboriginal burning at a landscape scale (Jones, 1994).

Presumably, when fire occurred more frequently and large grazing animals roamed free, there were large areas of parts of Tennessee and the Southeast which had relatively few trees, with abundant stands of native grasses and flowering herbs, like composites and legumes (Pyne, 1998). Under present conditions, this community persists on roadsides and recently disturbed areas. In Alabama, this species has been found in Franklin and Winston counties outside of the established administrative boundary of the Bankhead, in open ridge top oak savannahs. Recent surveys of sites to be treated within the Forest Health and Restoration Project did not reveal the presence of this species.

II. C. 2. b. Direct, Indirect, and Cumulative Effects - Eggert's sunflower

Direct impacts to this plant would be minimized by conducting pre-project surveys to determine its presence. Stands to be treated under this project were surveyed and this species was not found on any site. There will be no direct impacts to this species from the project.

The management practices of the Forest Health and Restoration Project include practices that would be indirectly beneficial to this species. Potential habitat sites would be maintained by prescribed burning activities that are utilized in several alternatives as a management tool to attain the particular desired future condition. Several alternatives call for restoration and maintenance of woodland habitats with understory forbs and grasslands. Expected levels of such restoration and maintenance vary by alternative but all with woodland habitats maintained by tools such as prescribed burning would provide some potential benefit. In addition, glades and barrens, with which this species is sometimes associated, would be protected from direct effects across all alternatives.

Cumulative effects to this species would vary depending upon which alternative were considered. In general, those alternatives with the greatest (largest acreage) usage of prescribed fire for maintaining open woodland conditions would potentially have the greatest beneficial impact to this species. Those alternatives with the least fire activity would tend to limit this plant.

III. C. 2. c. Determination of Effect – Eggert's sunflower

This plant is not known to exist on the Bankhead National Forest. Although it has been found near to the administrative boundary of the Bankhead, all previous plant surveys since 1997 as well as those conducted recently have failed to locate a single remnant plant within the areas to be treated for this project. For that reason, the determination is No Effect on Eggert's sunflower.

II. C. 3. Fleshy-fruit Gladecress (*Leavenworthia crassa* Rollins var *crassa*)

II. C. 3. a. Environmental Baseline

The Fleshy-fruit glade-cress is listed as a Candidate for federal listing by the USFWS and is on the Regional Forester's Sensitive Species list for the southern region, USDAFS. This is only known to occur in southeastern Lawrence and southwestern Morgan counties in Alabama. This gladecress has been found in two glades on the Bankhead National Forest. It has been reported but believed to be extirpated from Lauderdale County, Alabama (McDaniels et al 1987).

This gladecress is an annual herb occurring on limestone glades, fallow fields and along roadsides on the Cumberland Plateau ecoregion (McDaniels et al 1987). It can be locally abundant in only a few localities within this small range.

Seeds germinate in the fall and form an overwintering rosette of leaves; leaves are mostly basal, pinnately lobed or pinnatifid (Kral 1983). Flowering occurs early March to April. Fruits are less than ½ inch long, fleshy and with a slender apical beak. By summer there is no sign of this winter annual, since it flowers, fruits and dies back early in the season. This gladecress is distinguished from others by the fleshy, almost round fruits, instead of the more elongate, linear, non-fleshy, corrugated fruits of other species (USFS 1996).

Glade-cress prefers a sunny, open habitat. Canopy openings around the margins of limestone open and cedar glades should prove beneficial to this species as long as no habitat is altered, rutted, entered by mechanical means or otherwise destroyed. Fire may be beneficial as long as the fuels are not heavy and the fires are not intense or for long duration. Monitoring should be conducted on known populations before and after all burning activities (Kral 1983). Also, if a glade is not actively managed, over time it will become encroached by eastern red cedar and other hardwoods, rendering it too shady for the glade-cress.

II. C. 3. b. Direct, Indirect, and Cumulative Effects – Fleshy-fruit glade-cress

Surveys were conducted on treatment areas but this species was not found on any site. All glades located within areas proposed for treatment will be identified prior to any management activities. All cedar glade communities, habitat at for fleshy-fruit glade-cress, would be physically protected under all alternatives. Several standards for rare communities ensure their maintenance and restoration across the landscape.

Since federal candidate plant species receive little or no legal protection on private land, this species may be vulnerable to extirpation on surrounding glades and suitable habitat. National Forest lands need to be especially cautious to retain and positively manage any habitat for this species.

II. C. 3. c. Determination of Effect – Fleshy-fruit glade-cress

It is important to realize that the Fleshy-fruit glade-cress is an annual, and thus may be more sensitive to environmental or site-specific events, beyond the control of forest management implementation. Although it has been found within the administrative boundary, plant surveys conducted recently (during its flowering period) have failed to locate a single plant within the areas to be treated for this project. For that reason, the determination of “**no effect**” is implicated for the Fleshy-fruit glade-cress when considered as a candidate species. The determination of “no impact” would be applicable for this species when considered as a “sensitive” species.

II. C. 4. Lyrate Bladderpod- *Lesquerella lyrata* Rollins

II. C. 4. a. Environmental Baseline

Lyrate bladderpod was federally listed as **threatened** in 1990. The species is typically found in disturbed limestone outcroppings, cedar glades and glade-like areas, which includes, open pastures, cultivated fields and roadsides in calcareous areas. The plant prefers thin soils covering limestone as well as red soils and is a plant of full sunlight (NatureServe Explorer 2001). This species may be found growing in association with *Juniperus virginiana* and some species of *Leavenworthia* (Kral 1983).

Lyrate bladderpod is an annual herb up to 3 dm in height. The stems are pale green and usually numerous with long, soft hairs. The plant is leafy from the base to the flower head. The basal leaves form a rosette about 4 – 10 cm long and resembles that of a dandelion. Stem leaves are ascending, with entire margins to distantly and coarsely low-toothed, mostly 3 cm long or less. The leaves at the base of the stem are clasping. Leaf color is pale green and has many hairs, especially at the margins and along the midrib beneath. The plant flowers from late February into late April and produces flowers on ascending stalks. The flowers have small weak hairs and are bright yellow with backs that are yellowish-green. The species closely resembles *Lesquerella densipila* in type, amount of hairs, in flower size and color, in pedicel and fruit shape but differs in that it has slightly smaller fruit, together with persistent styles, are perfectly smooth. The seeds are flattened and margined, 2.0 – 2.5 mm long. (Kral, 1983)

In 1983 the only known populations of the lyrate bladderpod were known from cedar glade areas in the eastern part of Franklin county in northwestern Alabama (Kral, 1983). Since that time, this

species was reported from Franklin, Lawrence, and Colbert counties, Alabama. Only six populations have been found (NatureServe Explorer, 2001). This plant has never been found within Bankhead National Forest.

Primary threats to the species include woody plant succession and urban and intensive agricultural development that destroys cedar glades. According to Kral (1983), the establishment of pine plantations would probably destroy the plant populations and grazing may cause damage to the species. Potential beneficial management practices, if done properly, might include thinning and cutting of overstory trees and would probably increase populations. They are definitely decreased by intensive row crop agriculture, or by the improvement of lowland pasture with grass species, which would close the canopy.

The species appears to maintain itself only in areas that are naturally or artificially cleared and where hardwood and understory shrubs are at low densities. The majority of the populations are found along roads rights-of-way and in pastures on private land.

II. C. 4. b. Direct, Indirect, and Cumulative Effects – Lyrate bladderpod

All cedar glade communities, habitat at for lyrate bladderpod, would be protected under all alternatives of the project.

Since federally listed plants receive little or no legal protection on private land, this species may be vulnerable to extirpation. Since no populations are known to occur on National Forest land, the direct and cumulative effects of National Forest planning alternatives on this plant are likely to be negligible.

II. C. 4. c. Determination of Effects – Lyrate bladderpod

Through implementation of the Forest-wide, T&E species and Riparian Standards, and the protection of all glade habitats in areas to be treated the selection of any of the alternatives will have **No Effect** on lyrate bladderpod.

II. C. 5. Mohr's Barbara's buttons-*Marshallia mohrii*

II. C. 5. a. Environmental Baseline

Mohr's Barbara's buttons is a federally **threatened** species of moist prairie-like openings in woodlands and along shale-bedded streams in a grass-sedge community. Additionally, several populations are located within, or extend into, road rights-of-ways. Soil associations are typically alkaline sandy clays that are seasonally wet and have a high organic matter content. Plant associations include *Helinium autumnale*, *Helianthus angustifolius*, *Lythrum alatum*, *Ruellia caroliniensis*, and prairie elements such as *Asclepias viridis*, *Asclepias hirtella*, *Helianthus mollis*, and *Silphium terebinthinaceum*.

Mohr's Barbara's buttons is an erect, perennial herb up to 7 dm tall, with a short, thickened, fibrilbearing, erect and thick-rooted rhizome. Stems branch only at the inflorescence and are often purplish. The basal leaves are the longest, 8-20 cm long, with the lowest leaves often clustered toward and around the base, grading gradually upward to shorter stem leaves, then grading into small, oblong or linear inflorescence leaves. The inflorescence consists of 2-10 heads that in full bloom are roughly 2.5 cm broad and 1.5 cm high. The flowers are all discoid, the corollas whitish, with linear, spreading lobes from which project the pale lavender anthers and the narrow, blunt-tipped whitish style branches. The fruit is an achene. Blooming occurs from mid-May through June (Kral, 1983).

At listing, 22 locations were known to occur in Alabama and Georgia in the Cumberland Plateau and Ridge and Valley physiographic regions (USFWS, 1991). One extant population was recently discovered within the administration boundary of the Bankhead National Forest

(Whetstone, 2002, personal communication). Approximately 10 new locations have been found in Georgia since listing (Protected Plants of Georgia).

Primary threats to the species include loss of habitat resulting from fire suppression and conversion of suitable habitat to pine plantations and agricultural land (Protected Plants of Georgia). Drainage of sites where extant populations occur would most likely be detrimental (Kral, 1983). Herbicide use, mowing during the flowering period and installation of underground cable or gas lines also has the potential to impact populations that occur within road rights-of-ways (USFWS 1991).

The species appears to maintain itself only in areas that are naturally or artificially cleared and where hardwood and understory shrubs are at low densities. Historically, fire may have maintained the open conditions required by this plant. Ten populations in Alabama and Georgia are moderate-sized with 100-300 individuals present. The remainder of extant populations support limited populations of 12-50 individuals.

II. C. 5. b. Direct, Indirect, and Cumulative Effects – Mohr’s Barbara’s buttons

Mohr’s Barbara’s buttons are associated with riparian and rare communities; therefore, these areas would be protected under all alternatives of the project.

Federally listed plants receive little or no legal protection on private land, thus this species may be vulnerable to extirpation. Since one population is known to occur on National Forest land, and suitable habitat is present for yet unknown populations, the direct and cumulative effects of National Forest planning alternatives on this plant could potentially impact its future existence.

II. C. 5. c. Determination of Effects – Mohr’s Barbara’s buttons

Through implementation of the Forest-Wide protection mechanisms such as streamside management zones, T&E species and Riparian Standards, the selection of any of the alternatives is **not likely to adversely affect** Mohr’s Barbara’s buttons.

II. C. 6. White Fringeless Orchid (*Platanthera integrilabia*)

II. C. 6. a. Environmental Baseline

White fringeless orchid (*Platanthera integrilabia*) is listed as a **Candidate** for federal listing by the US Fish and Wildlife Service and is on the Regional Forester’s **Sensitive** Species List for the Southern Region. A Conservation Strategy (Bailey, 2001) was developed for this species in 2001 that includes a rangewide summary of existing population information and a comprehensive literature review. Much of the information provided below is taken from that document.

Platanthera integrilabia (Corell) is currently known from a total of sixty-one extant locations within five states (Alabama, Georgia, Kentucky, Mississippi, and Tennessee) and is considered extirpated from three states (North Carolina, South Carolina, and Virginia). Existing populations are summarized in Table BA.P.

Table BA.Q - White Fringeless Orchid			
The Distribution of White Fringeless Orchid (<i>Platanthera integrilabia</i>) Populations by State Throughout it's Range.			
State	Total Number Of Extant Sites	Total Number of Historic Sites	Total Number Of Extant Sites on Forest Service Lands
Alabama	7	1	6
Georgia	8	1	X
Kentucky	12	3	X
Mississippi	1	2	X
North Carolina	0	3	0
South Carolina	0	1	0
Tennessee	33	9	2
Virginia	0	?	0
Data from State Heritage Programs (Bailey 2001)			

Platanthera integrilabia populations occur across a wide geographic area and consequently are found under a diverse array of environmental conditions. Because of this, it is difficult to characterize the specific habitat requirements for any given locale, however, in general plants are found in wet, boggy areas, stream heads, or seepage slopes in acidic muck or sand, in flat or at the bottom of sharply sloped streamside in association with species of *Sphagnum* moss and one or more of the following fern species: Cinnamon fern (*Osmunda cinnamomea*), chain fern (*Woodwardia areolata*), and New York fern (*Thelypteris noveboracensis*).

The rarity of *Platanthera integrilabia* throughout its range may be dependent on a combination of several factors including natural rarity of habitat, habitat loss, low seed germination rates, low flowering and fruit-set rates, and lack of effective pollinators. Habitat loss is recognized as the primary threat to the species rangewide and can be manifested directly through habitat conversion, or indirectly, through alterations to the hydrology at a given site that occur as secondary effects from activities such as road building, timber harvest, mechanical entry, horse logging, rutting, etc. Siltation of habitat, herbivory, and competition from exotic species are other threats that may impact populations.

Like many orchid species, *Platanthera integrilabia* is dependent upon a symbiotic relationship with a fungus for seed germination (Zettler et al. 1990, Zettler and McInnis 1992, Zettler 1994, Currah et al. 1997). While an individual orchid capsule may produce thousands of dust-like seeds, only a tiny fraction of those seeds will be dispersed to a site that supports adequate habitat conditions and the required fungal species for seed germination. While many orchid species have a symbiotic relationship with several different fungal species, it has been suggested (Crock 1996, Zettler 1996) that the distribution of *Platanthera integrilabia* is further limited by the fact

that there may be only a single fungal symbiont capable of initiating seed germination. Zettler (1996) showed that both in the lab and under natural conditions only 3% of *Platanthera integrilabia* seeds germinate to produce a seedling plant. Similarly, only a very small percentage of individuals ever flower and set viable seeds. With so many biological constraints affecting the viability of populations, the importance of maintaining existing populations and quality habitat through land management is heightened.

Platanthera integrilabia is known from 1 location on the Bankhead. Surveys performed on the sites proposed for treatment within this project revealed no occurrences of this species.

II. C. 6. b. Direct, Indirect, and Cumulative Effects – White fringeless orchid

A Conservation Strategy (Bailey 2001) that was completed for *Platanthera integrilabia* emphasizes monitoring of existing populations and inventory of suitable habitats to locate new populations. Major threats to Alabama National Forests populations are feral hogs, plant poachers, exotic/invasive plants, and alterations to existing hydrology and timber management activities.

The combination of forest-wide standards and site specific mitigations described above afford necessary protection to *Platanthera integrilabia* populations and habitats from potential negative effects due to forest management activities. Despite this, the species has some inherent biological limitations that could continue to pose risks to its long-term viability, especially at sites where population numbers are low.

Table 1 (in Section 0.1 above) shows that out of 8 extant sites for the species in Alabama, only 6 occur on Forest Service lands. Based upon this, it is apparent that while Forest Service conservation actions may contribute to rangewide viability, they cannot maintain it. Cumulatively, the long-term viability of the species across its range is at great risk.

II. C. 6. c. Determination of Effects – White fringeless orchid

On the National Forests in Alabama, all wetland habitats and known sites for *Platanthera integrilabia* are currently protected. Additionally, pre-project surveys have not found this rare plant on any of the sites proposed for treatment. Potential impacts to individuals remain at all sites through plant poaching. Inherent biological limitations based upon population dynamics may continue to pose risks to the species long-term viability, especially at small sites. Based upon this, under the implementation of any Plan alternative a determination of “no effect” as a candidate species is made for *Platanthera integrilabia*. Also see this species under the “sensitive species” evaluation.

II. C. 7. Kral’s Water-plantain (*Sagittaria secundifolia*)

II. C. 7. a. Environmental Baseline

Kral’s Water-plantain was listed as **threatened** by the USFWS in 1990. It was first listed as occurring in Little River drainage system, but in recent years 3 sites were discovered in the Sipsey fork on the Bankhead National Forest. In the summer of 2000, one additional population was found in Brushy Creek (unpublished CCS reports, USFWS), on the Bankhead National Forest.

This species typically occurs on frequently exposed shoals or rooted among loose boulders in quiet pools up to 1 meter in depth. Plants grow in pure stands or in association with various submergents (Bowker 1991). Flowering is infrequent, and occurs from May into July and intermittently into the fall (Kral 1983). Flowering has only been observed in areas of direct sunlight and at a water level that allows emergent leaves (Whetstone 1988).

Sphagnum seeps are frequently found with this species, and it prefers areas with stream bottoms that are narrow and bounded by steep slopes. Extant populations have only been found to occur

on underlying formations of Pottsville sandstone (Bowker 1991). Eight of the twelve populations on the Little River system occur in pools or in riverine areas with partial canopy coverage. The remaining 4 occur in shallow shoals, supporting several dozen plants (Whetstone 1988).

II. C. 7. b. Direct, Indirect, and Cumulative Effects – Kral's water-plantain

The most severe threat to this species is the elimination or adverse modification of the already limited habitat. Clearing, sedimentation, hydrological function alteration and similar impacts have already caused the extirpation of at least one population (Kral 1983). Extreme water turbidity and dense filamentous algae decrease the amount of light available to the plants for growth and flowering.

Impoundments may have destroyed additional undocumented populations, since populations have been found above and below impoundments currently in place (Bowker 1991). These populations are particularly vulnerable to single disaster or human caused disturbances which could conceivably wipe out over a third of the known populations in a single event. Thus it is even more critical that the populations that occur on federal lands be protected and managed to retain and improve habitat critical to this species.

II. C. 7. c. Determination of Effects – Kral's water-plantain

The sites which have been found on the Bankhead all occur on the mid-reaches of the Brushy and Sipsey Rivers, above the Smith Lake impoundment. Due to the habitat favored by the Kral's water plantain, and the strict protection of these sites that would be part of any of the alternatives of this project, the determination of "No Effect" is made for Kral's water plantain.

II. C. 8. Alabama Streak-sorus Fern (*Thelypteris pilosa* var *alabamensis*)

II. C. 8. a. Environmental Baseline

The Alabama Streak-sorus fern was federally listed as **threatened** in 1992. It was first discovered in 1949 on sandstone cliffs above the Sipsey Fork, in Winston County, Alabama. Construction of a bridge destroyed the type locality, and it was believed to have been extirpated until its rediscovery approximately 8 miles upstream (Short & Freeman 1978). Subsequent field surveys have found at least 15 other sites along 4 miles of the Sipsey Fork, however this species has not been found elsewhere, despite numerous field surveys.

The Alabama Streak-sorus fern is a relatively small spray-cliff fern. It differs from other *Thelypteris* species in that it has no indusia, and having sinuses of the pinnule margins reached by one lateral vein rather than by two (Smith 1993, Kral 1983). It is confined to Pottsville sandstone formations and requires high substrate moisture, high humidity and shade. Plants are located within crevices or fissures, on ceilings and recessed walls or ledges on overhangs associated with small waterfalls. Occasionally plants could be found in moist seepage areas on exposed vertical rock faces. It is a spray-cliff dependent species, and must have moisture by seepage, humidity, shade, but also adequate diffuse light. The herbaceous species assemblage of the sandstone overhangs is part of the river gorge's well developed hemlock forest association (Kral 1983, Gunn 1997).

II. C. 8. b. Direct, Indirect, and Cumulative Effects – Alabama streak-sorus fern

The Alabama streak-sorus fern is known only to occur in Winston County, Alabama. The type locality was destroyed, but subsequent work by the Alabama Natural Heritage program revealed 17 distinct extant occurrences distributed along 4 miles of the Sipsey Fork (Gunn 1997). This plant was not found in any of the surveys of the proposed areas to be treated under this project. The minimum historical distribution is assumed to include this area plus the stretch of the stream which is now inundated by the Smith Lake impoundment. It is probable that the species also occurred downstream, and perhaps even on the Brushy Creek or Rockhouse Creek (Gunn 1997).

The Alabama Streak-sorus fern is found primarily on a single drainage on the Bankhead National Forest. The Sipsey River contains the only populations known in the world. It is thought that water impoundments on streams in the Black Warrior River drainage have destroyed a large number of fern colonies, and it is vulnerable to any activities that would change the hydrology of its habitat and dehydrate its microhabitat (USFS, 1997).

II. C. 8. c. Determination of Effects – Alabama streak-sorus fern

The section of the Sipsey River, above the Smith Lake impoundment on the Bankhead National Forest is the only known site in the world to contain the Alabama streak-sorus fern. The overall greatest threat is described as its vulnerability to a single natural or human-induced disturbance, given its extremely restricted range and the relatively small number of plants that make up its total population (USFS 1997). Given that a single catastrophic event could produce negative results, it is possible that any management action other than protection, including that which results in an increase in the lake level could destroy all or a portion of this species. Management activities for the Forest Health and Restoration Project will not impact habitats where this plant occurs. Neither plants nor their habitat were found during any of the surveys conducted for this project. However, the actions associated with this project would provide strict protection to the riparian areas which this plant is found. Thus the determination is of “**No effect**” for the Alabama Streak-sorus fern.

II. C. 9. Tennessee Yellow-Eyed Grass (*Xyris tennesseensis*) Kral

II. C. 9. a. Environmental Baseline

The Tennessee Yellow-eyed Grass (*Xyris tennesseensis*) was first described as a separate species by Robert Kral in 1978. It was listed as an **endangered** species in 1991.

The Ridge and Valley physiographic region is a key area for this species, as are portions of the Highland Rim & Upper Gulf Coastal Plain. There are less than 4 locations documented in Georgia (Bartow & Whitfield counties), two documented locations in Tennessee (Lewis county) and less than 12 locations documented in Alabama. Nine of the Alabama sites are located in three Alabama counties – Franklin, Calhoun & Bibb, all of which are counties-of-occurrence for the Bankhead National Forest, the Shoal Creek & Talladega Districts and the Oakmulgee District, respectively. This alone represents over half of the sites known worldwide. The Gordon county, Georgia population is considered to be extirpated, as is one of the Bartow county, GA populations (Kral, 1990).

The Georgia populations and the majority of the Alabama populations are located within the Ridge & Valley. However, the populations in Franklin County, Alabama and the Bibb County sites, just below the fall line, occur in the Upper Gulf Coastal Plain (Kral, 1990).

The Tennessee Yellow-eyed Grass is a perennial herb with basal, erect linear leaves (NatureServe, 2002). The plant typically occurs in clumps, with the leaves clustered at the bulbous base, the outermost leaves being small and having a dark purplish-maroon to pinkish red scale-like appearance (Patrick et al, 1995). The inner leaves are larger and linear in shape, varying in length from 3-18 inches long, deep green in color, and slowly twisting as it ascends up the stalk (Gothard, 1995). The unbranched flowering inflorescence consists of brown cone-like spikes, single at the tips of each one to three foot tall flower stalk, containing small, pale yellow flowers (three petals) which open in the morning, wither in the afternoon, and only appear a few at a time (Somers, 1993, Gothard, 1995). Roots are slender, shallow & fibrous (Kral, 1983). Fruits are obovoid or broadly ellipsoid capsules with thin, plano-convex walls and three sutures, with numerous ellipsoid seeds covered by 18-20 fine, longitudinal lines that are sometimes interconnected (Kral, 1983, Somers, 1993). Blooming occurs from August to September, with fruiting from September to October.

All yellow-eyed grasses require habitats that are moist to wet year round, ranging from sunny to partial shade or very thinly wooded (with little canopy cover) conditions. Preferred landforms include drains, swales, seeps, springs, springy meadows, bogs, fens and banks of small streams. The Tennessee Yellow-eyed Grass differs from other Xyridaceae in that instead of preferring acidic sites, it is found where calcareous rock such as shale, limestone and dolomite are at, near or have been deposited near the soil surface, or where thin calcareous soils are present (NatureServe 2002, Somers 1993). This character results in soils that are more neutral to basic than acidic (Gothard, 1995). Community types include seepage slopes, springy meadows, bogs and streamsides (Kral, 1983, NatureServe 2002). Substrates include gravelbars, sandbars, shallow sand/soil deposits or cracks in the limestone, narrow sandbars located on ketone dolomite, wet ditches of mixed clay and sand, and rich deposits of marshland. One site occurs on an earth dike in an impounded swamp. Soils are slow to establish and prone to erode during heavy rain events because most sites are wet and relatively steep (Somers, 1993). The sites tend to be open, wet disturbance or open-canopy early successional-related herbaceous understory habitats, with an abundant herbaceous layer and few woody shrubs and a thin canopy of trees.

Where populations of Tennessee Yellow-eyed Grass occur along separate parts of the same stream, continuous corridors of suitable habitat are not available and they are often widely separated (USFWS 1994). In these instances, propagules may move downstream to mix with those of other populations or colonize suitable habitat where it exists, however only seldom would there be opportunity for upstream movement of propagules or pollinators from site to site (Somers, 1993).

Despite extensive surveys, fewer than 20 populations are known to be extant, with each site occupying less than ½ an acre. Only one site is known to contain more than a few hundred plants, with at least three containing less than 20 individuals (Kral, 1990, Patrick et al, 1995). Due to the small size of most of these population sites, Kral suggested that Tennessee Yellow-eyed Grass was historically rare throughout its range. Three historical populations have been lost, and at least 4 of the remaining populations are in decline due to highway construction/right-of-way maintenance and other habitat destruction (NatureServe, 2002). In addition to sites lost during road construction, other significant habitat losses have been sustained as a result of drainage of lowland wetlands, conversion to agricultural fields, careless forest management practices and impoundment of wetlands (Patrick et al, 1995, Kral 1990, NatureServe 2002, USFWS 1994).

II. C. 9. b. Direct, Indirect, and Cumulative Effects – Tennessee yellow-eyed grass

The endangered status of the Tennessee Yellow-eyed Grass is primarily a result of its apparent limited distribution and the fragile nature of the habitat upon which it depends (Gothard, 1995). The activities responsible for loss of habitat are varied but they all lead to habitat destruction through conversion or loss of the original hydrological function. For the Tennessee Yellow-eyed Grass, ground disturbing activities, impoundments, road construction have the greatest potential to affect both individuals and populations. The other sources of habitat modification or destruction, described above, are not permitted on National Forest lands.

Based on the plant's wetland habitat and the general biology of yellow-eyed grasses collectively, Tennessee yellow-eyed grass could be positively managed by protecting sites from encroachment by woody shrub species leaving a partial (or thinned) overstory canopy in place and ensuring that activities taking place in areas where the plant occurs do not adversely affect the hydrology of the site (Moffett, 2002). Management options would include hand removal of woody midstory/shrub encroachment, thinning based on site-specific recommendations and mitigation, and burning. Total canopy removal is not recommended (Moffett 2002).

There are no known populations located on the National Forests in Alabama, however there is a site within 2 miles of the Bankhead National Forest. Habitat meeting the general description necessary for the Tennessee Yellow-eyed Grass is present on the Bankhead National Forest.

Protection and surveys for habitat and new populations will be included in our recovery objectives. Surveys of stands to be treated did not indicate the presence of this plant. All ground disturbing activities that occur on National Forest lands will employ the Forest-Wide and Riparian Standards. Implementation of these standards will be monitored and corrected as needed or as new information becomes available.

The effects of management show that although total canopy cover removal induces enhanced flowering of the Tennessee Yellow-eyed Grass for the first year following the action, subsequent years show that the woody encroachment and other herbaceous species out-compete this species, resulting in a decline (Moffett, 2002). Prescribed burning during the winter and early spring (opposite the flowering period) seem to produce positive results, as does careful midstory removal, taking care to keep soil compaction to a minimum and allowing no rutting to occur.

II. C. 9. c. Determination of Effects – Tennessee yellow-eyed grass

Surveys conducted on areas proposed for treatment under this project, did not locate this species nor its habitat. Through implementation of the Forest-Wide, T&E species and Riparian Standards, and due to the fact that there are no sites found directly on National Forests in Alabama lands, the selection of any of the alternatives will have **No Effect** on the Tennessee Yellow-eyed Grass (*Xyris tennesseensis*).

Table BA.R - Determination of Effects for Federally Listed Aquatic and Terrestrial Plants

<i>Scientific Name</i>	<i>Common Name</i>	<i>Determination of Effects</i>
<i>Dalea foliosa</i>	Leafy prairie clover	No Effect
<i>Helianthus eggertii</i>	Eggert's sunflower	No Effect
<i>Lesquerella lyrata</i>	Lyrate bladder-pod	No Effect
<i>Marshallia mohrii</i>	Mohr's Barbara's buttons	No Effect
<i>Sagittaria secundifolia</i>	Kral's water-plantain	No Effect
<i>Thelypteris pilosa</i> var <i>al.</i>	Alabama streak-sorus fern	No Effect
<i>Xyris tennesseensis</i>	Tennessee yellow-eyed grass	No Effect
<i>Leavenworthia crassa</i>	Fleshy-fruit gladeceess (Candidate species)	No Effect
<i>Platanthera integrilabia</i>	White fringeless orchid (Candidate species)	No Effect

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Biological Evaluation
of
Sensitive and Locally Rare Species

Forest Health And Restoration Project

Bankhead National Forest
Franklin, Lawrence, and Winston Counties, Alabama

Introduction

A biological evaluation is a documented review of programs or activities to determine the effect on sensitive and locally rare species and to determine their viability. The purpose and need for this Forest Health and Restoration Project is described within Chapter 1 of the Environmental Impact Statement. The various alternatives are fully described within Chapter 2 of that document. This Biological Evaluation (BE) addresses the effects of the Project and its associated management activities.

The need to conduct site-specific inventories of those federally listed species (threatened, endangered or candidate), the species designated by Forest Service as regionally sensitive, and locally rare species, for this project was assessed using direction in Forest Service Manual Supplement R8-2600-2002-2. Based on this assessment, affected potential habitat in the project area was inventoried for presence of the species as noted within this document. Professional botanists and wildlife biologists were contracted to make field examinations. Survey results and field notes were too voluminous for inclusion here and thus are located in the project file. Any area containing glades, rock outcrops, aquatic areas, riparian areas or wetlands, which are habitats where many protected, threatened, endangered, sensitive and locally rare species are typically found, were identified. These areas will receive due protection as required throughout implementation of the Forest Health and Restoration Project.

The objective of this biological evaluation is to examine possible effects resulting from implementation of each alternative outlined within the Environmental Impact Statement on protected sensitive and locally rare species of plants and wildlife. This evaluation is to ensure that Forest Service actions do not contribute to the loss of viability of any native or desired non-native plant or animal species or trends towards federal listing of any species. This complies with the requirements of the Endangered Species Act of 1973 and the National Environmental Policy Act. It also provides a process and standard by which to ensure that threatened, endangered, proposed, sensitive and locally rare species receive full consideration in the decision making process.

A description of the sites proposed for treatment (loblolly stands to be thinned and Southern Pine Beetle Areas to be restored) is included within the main body of the Environmental Impact Statement. Management actions proposed through this Forest Health and Restoration Project include prescribed burning, site preparation, reforestation, and thinning and associated temporary road construction. Desired future conditions (landscape conditions) that will result from implementation of this initiative include:

- Mixed Mesophytic Forests
- Conifer-Northern Hardwood Forests
- River Floodplain Hardwood Forests
- Dry-Mesic Oak Forests
- Dry and Dry-Mesic Oak-Pine Forests
- Dry and Xeric Oak Forest and Woodlands
- Xeric Pine and Pine-Oak Forest and Woodlands (Shortleaf Pine/Bluestem Woodlands)
- Upland Longleaf Pine/Bluestem Woodlands

Mitigation which is common to all alternatives included with this Project are described within Chapter 2 of the Environmental Impact Statement. Monitoring measures for biological resources are discussed within Chapter 3 of the Environmental Impact Statement.

CONSULTATION HISTORY and SURVEY INFORMATION

Biological surveys and evaluations have been conducted on the Bankhead National Forest for previous projects over a period of many years. Site-specific biological surveys were conducted as a part of this evaluation and Environmental Impact Statement development. A listing of all known locations of endangered, threatened, sensitive, and locally rare species on the Bankhead is maintained at the District Office in Double Springs. These records were reviewed as a part of this evaluation. The USDA Forest Service has consulted with the U.S. Fish and Wildlife Service as a part of this project regarding Federally listed species. Many species of sensitive and locally rare plants are found within the same habitats as the Federally listed species. Consultation with the U.S. Fish and Wildlife Service is not required for sensitive and locally rare species.

Project level inventories were conducted to gather information on the presence or absence of protected species (federally listed, Forest Service sensitive and locally rare) within the area affected by the project. All loblolly pine stands with project activities planned were evaluated.

Biological surveys have been completed for 100% of loblolly pine stands between the ages of 21 and 45 years, which are planned to be treated by an activity that causes ground disturbance. This includes thinning of pine stands and the site preparation activities, such as drum chopping and site preparation burning, which will be required for restoration treatments.

In addition, survey methodology called for sampling of sites comprised of loblolly pine plantations which are between 15 and 20 years of age. These loblolly stands are at the age where a majority of the shrub and herbaceous understory is absent. This is due to the thick and bushy growth of pine trees at this age, which prevents sunlight from reaching the forest floor, effectively reducing the development of an understory. Based upon experience and field reviews conducted on Bankhead National Forest, these stands were determined by the Forest Botanist and the Bankhead District Wildlife Biologist as the stands with the lowest likelihood for occurrence for protected species. Field surveys were performed on 48% of the acreage of these sites. Consistent with the biologist's recommendation, no federally listed or Forest Service sensitive species were found during surveys. However, a small percentage of the sites were found to have some of the locally rare species within or adjacent to the stand (Blue Ridge trillium, silky camellia, small head gayflower, pinesap, little leaf alum root and *Nestronia*). Due to the fact that this is a higher than anticipated incidence of occurrence, additional monitoring will be conducted on these 15 to 20 year old loblolly plantations prior to implementation of the project. If additional locally rare species are discovered on these sites, they will be recorded and protected as required.

SPECIES EVALUATED

All species listed by the Fish and Wildlife Service in accordance with the Endangered Species Act of 1973 (as amended), as threatened, endangered or candidates which have either known or historic range within the proclamation boundary were considered for evaluation. All species from the Regional Forester's Southern Region Sensitive Species List that potentially occur within the Bankhead National Forest were considered for evaluation. Those Locally Rare Species as identified by the Forest Service were considered for evaluation. Some species from these lists occur within habitats and locations that are not found on the Bankhead National Forest. Each of the respective species, which are known to be found or have historical habitats on the Bankhead National Forest were considered in this evaluation. In such cases, these species have either been found on Bankhead in the recent past or the historical habitat range includes Bankhead. All habitats for upland and aquatic plant and wildlife species were considered. Species associated with glades, rock outcrops, cliffs, seeps, springs, and streamside habitats were evaluated although these habitats will be protected during the implementation of the Forest Health and Restoration Project and will not be impacted.

SENSITIVE SPECIES – BANKHEAD NATIONAL FOREST

A list of terrestrial Forest Service “Sensitive” species known, or suspected, to occur, on or near the Bankhead National Forest :

Table BE.A - Forest Service Sensitive Species List - Terrestrial

Common Name	Scientific Name	Status/Rank	Habitat
Small flowered buckeye	<i>Aesculus parviflora</i>	S2S3G2G3	18
Tennessee Milkvetch	<i>Astragalus tennesseensis</i>	S1G3	6
Spreading yellow false foxglove	<i>Aureolaria patula</i>	S1G2G3	7
Bryson’s sedge	<i>Carex brysonii</i>	S1G1	18
Alabama larkspur	<i>Delphinium alabamicum</i>	S2G2	6
Riverbank bush-honeysuckle	<i>Diervilla rivularis</i>	S2G3	11
Gorge filmy fern	<i>Hymenophyllum tayloriae</i>	S1G1G2	7
Butternut	<i>Juglans cinerea</i>	S1G3G4	18
Alabama Gladecress	<i>Leavenworthia alabamica</i> var. <i>ala</i>	T2T3G2G3	6
Fleshy-fruit Gladecress	<i>Leavenworthia crassa</i>	CS1G2	6
Duck River Bladderpod	<i>Lesquerella densipila</i>	SHG3	6
Sweet pinesap	<i>Monotropsis odorata</i>	G3	19
Nevius’ stonecrop	<i>Sedum nevii</i>	S3G3	7
White fringeless orchid	<i>Platanthera integrilabia</i>	CS2G2G3	2
Yellow fringeless orchid	<i>Platanthera integra</i>	G3G4	2
Alabama snow-wreath	<i>Neviusia alabamensis</i>	S2G2	6
Alabama skullcap	<i>Scutellaria alabamensis</i>	S2G2	7
Blue Ridge catchfly	<i>Silene ovata</i>	S1G2G3	7
Jeweled Trillium	<i>Trillium simile</i>	G3	18
Menge’s fameflower	<i>Talinum mengesii</i>	S2S3G3	6

Common Name	Scientific Name	Status/Rank	Habitat
Little mountain meadow rue	<i>Thalictrum mirabile</i>	QS1G2G3	7
Clammy Locust	<i>Robina viscosa</i>	G3	17
Limestone Fameflower	<i>Talinum calcaricum</i>	S2G3	6
Lanceleaf Trillium	<i>Trillium lancifolium</i>	S2S3G3	11
Broadleaf Barbara's Buttons	<i>Marshallia trinervia</i>	S3G3	11
Diana Fritillary	<i>Speyeria diana</i>	S3G3	11
Rafinesque's Big-eared Bat	<i>Corynorhinus rafinesquii</i>	G3G4 S2	10
Scott's Spleenwort	<i>Asplenium x ebenoides</i>	HYBS1	7
Pinnate-lobed Black-eyed Susan	<i>Rudbeckia triloba</i> var <i>pinnatiloba</i>	S2S3G4T2	7

Key to Table Above - Habitat Associations

- 1= Cave Habitats
- 2= Wetland (Bog) Habitats
- 6= Glades, Prairies, and Woodland Habitats
- 7= Rock Outcrop and Cliff Habitats
- 8= Grass/Forb Habitats
- 10= Mid- to Late- Successional Deciduous Forest Habitats
- 11= Forest Riparian Habitats
- 12= Habitat Generalist
- 13= Area Sensitive Mid- and Late-Successional Deciduous Forest Habitats
- 17= Southern Yellow Pine Forests and Woodland Habitats
- 18= Mixed Mesic Forest Habitats
- 19= Mixed Xeric Forest Habitats
- 20=Shrub/Seedling/Sapling Habitats
- 21=Seeps and Springs

A list of aquatic Forest Service “Sensitive” species known, or suspected, to occur, on or near the Bankhead National Forest:

Tabel BE.B - Forest Service Sensitive Species List - Aquatic

Common/Scientific Name	Ranking	Common/Scientific Name	Ranking
Cocoa clubtail <i>Gomphus hybridus</i>	S3S4G3G4	A liverwort <i>Riccardia jugata</i>	G1G2
A caddisfly <i>Hydroptila paralatosa</i>	S2G2	Alabama Jamesianthus <i>Jamesianthus alabamensis</i>	S3G3
A caddisfly <i>Rhyacophila carolae</i>	S1G1	Longhead darter <i>Percina sp. cf. macrocephala</i>	G3
Alabama spike <i>Elliptio arca</i>	S2G3	Southern Hickorynut <i>Obovaria jacksonian</i>	S2G1G2
Southern creekmussel <i>Strophitus subvexus</i>	S2G3	Alabama Hickorynut <i>Obovaria unicolor</i>	S2G3
Alabama rainbow <i>Villosa nebulosa</i>	S3G3	Black Warrior waterdog <i>Necturus alabamensis</i>	S1G2
A liverwort <i>Aneura maxima</i>	G1G2	Warrior darter <i>Etheostoma bellator</i>	S2G2
A liverwort <i>Cheilolejeunea evansii</i>	S1G1	Tuskaloosa Darter <i>Etheostoma douglasi</i>	S2G2
A liverwort <i>Pellia X appalachiana</i>	G1	Rush Darter <i>Etheostoma phytophyllum</i>	S1G1
A liverwort <i>Plagiochila echinata</i>	G2	Tuscumbia darter <i>Etheostoma tuscumbia</i>	S2G2
A liverwort <i>Radula sullivantii</i>	G2		

Some species are of concern although not listed as threatened or endangered by the FWS. They have been ranked Globally as G1, G2 or G3 by the Natural Heritage Network of The Nature

Conservancy, which means viability concerns throughout their entire range. This may be due to habitat requirements, range limits or particular vulnerability to activities. These species have been listed by the Regional Forester as Sensitive and require special consideration in order to ensure that viability is not impaired and to preclude any trend toward the necessity of their being proposed for listing as threatened or endangered by the FWS. According to the Natural Heritage Network rankings, G1 species are critically imperiled globally because of extreme rarity (typically less than 5 occurrences, less than 1,000 individuals or very few remaining acres) or because of some factor(s) making them especially vulnerable to extinction. Species ranked G2 are imperiled globally because of extreme rarity (typically 6-20 occurrences, 1,000 to 3,000 individuals or few remaining acres) or because of some factor(s) making them very vulnerable to extinction. Species ranked as G3 are rare or uncommon (typically 21-100 occurrences or 3,000 to 10,000 individuals) throughout its range; or found locally, even abundantly, in a restricted range (e.g. in a single state or physiographic region); or vulnerable to extinction throughout its range because of specific factors. G4 ranking indicates apparently globally secure. Rankings begin with a T instead of a G are used for subspecies and two rankings together, such as G2G3, indicates uncertainty in the ranking of that species. A question mark (?) indicates some doubt concerning the status of the species or subspecies. HYB indicates a hybrid. Rankings preceded by an S indicate the status inside the state of Alabama as determined by the Alabama Natural Heritage Program. The list of plant and animal species is based upon the Southern Region Sensitive Species.

TERRESTRIAL SENSITIVE SPECIES – Considered but not Evaluated

Species listed below were initially considered but were dropped from further evaluation for the reasons noted within. Generally these are species that potentially have habitat here but have never been found within Bankhead National Forest. Habitats would not be impacted by project.

SCOTT'S SPLEENWORT

Environmental Baseline

This species is associated with rock outcrops and cliff habitats. It is found in cool rock crevices (limestone, sandstone, or conglomerate cliffs) with a northern exposure. It is also associated with moist, shady habitats. It is not known from Winston, Lawrence or Franklin counties, but has been encountered in Jefferson County. Rock outcrops and cliff habitats will be protected during this project, and no impact to associated species will occur. This species was not encountered during biological surveys of project areas.

SPREADING YELLOW FALSE FOXGLOVE

Environmental Baseline

This species has been encountered in Cherokee County. Other species of *Aureolaria* are found on a variety of sites from upland hardwoods to sandy sites of the coastal plain. This particular species is found on river bluffs in Tennessee. It is not known from the Bankhead National Forest or surrounding areas. This species was not encountered during biological surveys of project areas.

ALABAMA LARKSPUR

Environmental Baseline

This species is associated with cedar glades, limestone or sandstone outcrops, sandstone cliffs or rocks. The larkspur is found in prairies, limestone cedar glades or open woods bordering these habitats. Glades will be protected during project activity. This species has not been encountered on the Bankhead and was not encountered during biological surveys of project areas.

TENNESSEE MILKVETCH

Environmental Baseline

This species is known from limestone glades in Morgan County. Potential habitat exists within the Bankhead National Forest, but the species is not known to occur here. Glades are a protected rare community type that will not be impacted through activities associated with this project. This species was not encountered during biological surveys of project areas.

DUCKRIVER BLADDERPOD

Environmental Baseline

This species is known to occur in Franklin and Marshall counties in calcareous fields and pastures. It has not been encountered within the Bankhead National Forest and is not expected to occur within the project area. *No impact* is anticipated as the appropriate habitat does not exist within the project area. This species was not encountered during biological surveys of project areas.

ALABAMA SNOW-WREATH

Environmental Baseline

This plant is known to occur in limestone woodlands and on bluffs. This species has not been recorded in Winston, Lawrence or Franklin counties. It has been recorded from DeKalb, Jackson, Madison, and Tuscaloosa counties but was not encountered during biological surveys of project areas.

BLUE RIDGE CATCHFLY

Environmental Baseline

This species is associated with cliffs, rock barrens, sandstone outcrops and rock houses. This habitat type is available on the Bankhead but will be protected during the project. This plant was not encountered during field surveys.

TERRESTRIAL SENSITIVE SPECIES - Evaluated

This section provides information on the determinations of effects on terrestrial Forest Service listed Sensitive plant and animal species on the Bankhead National Forests.

SMALL-FLOWERED BUCKEYE, BUTTERNUT and BRYSON'S SEDGE

Environmental Baseline

These species are associated with mixed mesic forest habitats. Small-flowered Buckeye is found in rich mesic woods and along creek margins. Butternut is found in rich, mesic hardwoods and streamside margins, especially in calcareous alluvial depositions along the streams. Bryson's sedge is found in rich, mesic deciduous woods, shaded slopes above streams or on bluffs above streams. It is relatively a newly identified plant (1993) and little is known about its life science. It is known from only two locations on the Bankhead National Forest. Neither of these locations are proposed for treatment through this Project. Surveys were conducted on project sites but these species were not found within the treatment areas.

Direct, Indirect and Cumulative Effects

Thinning, site preparation and temporary road construction are not expected to impact these species. Since these species are found in mesic areas, the projects primary thrust of treating loblolly pine stands is not expected to impact any current or potential habitat. Thinning, site preparation by roller drum chopping or construction of temporary roads will not occur within riparian areas where these species are likely to occur.

Mixed mesophytic forests, dry mesic oak forests, and dry and dry-mesic oak-pine forests will provide habitat for these species. Individuals currently existing within the mixed mesophytic forests on the Bankhead will not be affected by this Project, as no actions are proposed within this forest type.

No impact is anticipated to these species.

WHITE-FRINGELESS ORCHID (also evaluated as a candidate species in section III.C.9 of the Biological Assessment)

Environmental Baseline

This species is associated with, but not limited to, low wet woods or areas that commonly fall into streamside management zones. For survival, it requires mesic conditions and at least partial shade. This species is not limited to a particular soil type. The white-fringeless orchid is found in bogs, seepage slopes, spring seeps or swamps. It grows in association with red maple, tulip tree, white oak, sweet bay, black gum, lady fern, royal fern, cinnamon fern, yellowroot and sphagnum moss. These habitats may be found in riparian areas or in the uplands.

Direct, Indirect and Cumulative Effects

Habitat for this plant will be protected during any project activities. Surveys conducted on project areas did not find any of these habitats nor any of this plant species. Riparian areas, seeps, swamps, and bogs are typically not the areas where this project would be conducted. Heavy equipment used for site preparation and thinning activities will not operate within the streamside management zones or wetlands. Areas to be treated have been surveyed and all wetland areas will be identified and protected during treatments.

Individuals currently existing on the Bankhead will not be affected by this Project, as no actions are proposed within the appropriate habitat type. *No impact* is anticipated to this sensitive species.

SWEET PINESAP

Environmental Baseline

Sweet Pinesap is associated with mixed xeric forests. This small saprophytic plant is noted to be found in dry sandy (acidic) woods and in pine and mixed pine/hardwood stands. It is apparently most often found under pines, giving rise to the common name. It has been reported as being saprophytic on pine roots and the bases of pine trees. It has been reported to occur in mixed deciduous hardwood pine stands also. In the south, it occurs in the mountain foothills and piedmont areas. The Nature Conservancy, Alabama Heritage Program has an agreement with the Forest Service to locate and identify individuals of this species on the Bankhead National Forest. Areas with historical records of occurrence have been re-visited to confirm presence or absence through this agreement. Despite past records of occurrence, it has not been located in subsequent field searches.

Direct, Indirect and Cumulative Effects

This species was not encountered during pre-project surveys, which were conducted during a known flowering period. Any species encountered through additional surveys and monitoring will be identified and protected from the direct impacts of equipment during road construction, site preparation or thinning. Small, non-descript and unknown populations may exist within areas to be treated. Proposed treatments such as thinning could potentially have a direct impact upon this species. The indirect effects of thinning a pine stand containing this species is not known. All known populations are outside of the proposed treatment areas of the project proposal. Small numbers of this species could be directly or indirectly impacted by this project.

Dry and Xeric Oak Forests and Woodlands, Xeric Pine-Oak Forests and Woodlands, and Longleaf Pine/Bluestem Woodlands will provide habitat for this species. Alternatives providing for these desired future conditions will have a beneficial cumulative effect on Sweet Pinesap due to restoration of potential habitat. *No impact* is anticipated to this species.

JEWEL TRILLIUM

Environmental Baseline

Jeweled trillium is associated with mixed mesic forests. This species has been encountered within the Bee Branch area of the Bankhead National Forest. The habitat of this plant is described as rich coves under mature trees, in rhododendron thickets along streams, and at forest edges, frequently on outcrops partially exposed by road building. The plant is associated with moist, rich sites. Although some other trillium species were found during field surveys, this species were not found on any site proposed for treatment.

Direct, Indirect and Cumulative Effects

This project and its associated activities is not expected to impact this trillium. This species is found in mesic, rich areas, this project will primarily occur on ridgetops and side slopes that are not current or potential habitat. Site-specific surveys have not found this plant on project areas. Any populations encountered through additional surveys and monitoring will be identified and protected from the direct impacts of equipment during road construction, site preparation or thinning.

Mixed mesophytic forests, dry mesic oak forests, and dry and dry-mesic oak-pine forests will provide habitat for this plant. Individuals which may currently exist within the mixed mesophytic forests on the Bankhead will not be affected by this Project, as no actions are proposed within this forest type. Alternatives providing for these desired future conditions will have a beneficial cumulative effect on Jeweled Trillium due to restoration and/or maintenance of appropriate habitat. *No impact* is anticipated to this species.

CLAMMY LOCUST

Environmental Baseline

This species is associated with Southern Yellow Pine Forests and Woodlands. This tree is reported to have grown in rocky woods in Winston County in the past. Other habitat descriptions include thin woods and open places. It is known to be present in a wildlife opening on Bankhead National Forest, but this opening is not a proposed treatment site.

Direct, Indirect and Cumulative Effects

Beneficial cumulative effects are anticipated due to restoration of potential habitat. Xeric Pine-Oak Forests and Woodlands (Shortleaf Pine/Bluestem) and Longleaf Pine/Bluestem Woodlands will provide suitable habitat for this tree. A *beneficial impact* is anticipated to this species.

RIVERBANK BUSH-HONEYSUCKLE

Environmental Baseline

This species occurs within forest riparian habitats. It has been encountered along streams in the Bankhead National Forest, but was not encountered during field surveys for this Project. Initiative-associated management actions will take place within upland stands and riparian areas will be protected.

Direct, Indirect and Cumulative Effects

There will be no effect on riverbank bush-honeysuckle during this Project. Streamside management zone guidelines will be adhered to. Current acreages of riparian habitat will remain

after implementation of this forest health and restoration initiative. *No impact* is anticipated to this species.

GORGE (TAYLOR'S) FILMY FERN

Environmental Baseline

This fern is somewhat to very epipetric in that they are usually found on more or less vertical rock faces. Gorge filmy fern grows on moist bluff faces. These sites will be protected during project activity. Surveys performed on project areas did not indicate the presence of this species.

Direct, Indirect and Cumulative Effects

Rock outcrops and cliff habitats will be protected during this Project and no impact to associated species will occur. *No impact* is anticipated to this species.

ALABAMA GLADECRESS & FLESHY-FRUIT GLADECRESS (Fleshy-fruit gladechress considered as a candidate species within section III. C.3 of the Biological Assessment)

Environmental Baseline

These species are associated with glades, prairies, and woodland habitats. Alabama gladechress is found on limestone glades and Fleshy-fruit gladechress occurs on calcareous cedar glades. Potential habitat for these species does exist within BNF, but was not encountered during surveys within the proposed treatment stands. Alabama gladechress has been encountered in Franklin and Lawrence counties. Fleshy-fruit gladechress is known from Marshall county, Alabama.

Direct, Indirect and Cumulative Effects

No impact on these species is anticipated, as the project will not impact glades, where these species are found. .

NEVIUS' STONECROP

Environmental Baseline

This species is somewhat to very epipetric in that they are usually found on more or less vertical rock faces. Stonecrop is most likely on rock faces above creeks on limestone or shale, and on limestone outcrops in woodlands growing amongst various mosses under light to heavy shade. No plants were observed during field surveys.

Direct, Indirect and Cumulative Effects

No effect on this species is anticipated. None of the areas proposed treatments include rock cliffs, outcrops or bluffs. Steep bluffs are present within a very few treatment stands. These sites will be identified and protected during implementation phase of the project.

No impact is anticipated to this species.

YELLOW FRINGELESS ORCHID

Environmental Baseline

This species is known to occur in bogs in Winston County. This plant and its habitat were not encountered during the field surveys conducted as a part of this evaluation.

Direct, Indirect and Cumulative Effects

The proposed treatment stands do not contain any bogs. The project will not create nor eliminate any bog habitat. No impact is anticipated to this species.

MENGE'S FAMEFLOWER and LIMESTONE FAMEFLOWER, ALABAMA SKULLCAP

Environmental Baseline

These species are associated with cedar glades, limestone or sandstone outcrops, sandstone cliffs or rocks. Menge's fameflower is found in soil pools within expanses of flat sandstone outcrops that are large enough to allow full sunlight or near full sunlight on the outcrop. It is known to occur on the Bankhead National Forest. The limestone fameflower also occurs on the district. The Alabama Skullcap is often associated with moist glades in oak-pine flats.

Direct, Indirect and Cumulative Effects

Glades and rock outcrops were encountered on several locations during field surveys. On some of these sites, individual Fameflowers (Menges and Limestone) were encountered during field surveys. These areas have been identified within the proposed treatment areas for thinning, site preparation or temporary road construction for this proposal. These glades will be identified during project activity planning and will be protected throughout the project. This forest health and restoration project will have no direct effect on these species. In some cases the thinning effect on surrounding trees will result in beneficial indirect effects to these glade species. The cumulative effect of this project will ultimately be beneficial for these species when found in close association with thinning operations. Any practice that encourages opening of the canopy and reduction of overstory will ultimately benefit these plants long term survival. There will be no direct effect from the project.

The project will have *no impact* to this species, as all sites to be treated have been surveyed and areas that were identified as having a presence of these plants will be protected during the planning and implementation phases of the project.

LITTLE MOUNTAIN MEADOW RUE

Environmental Baseline

Little mountain meadow rue is associated with rock outcrop and cliff habitats. This species is somewhat to very epipetric in that they are usually found on more or less vertical rock faces. Little mountain meadow rue is found under wet ledges.

Direct, Indirect and Cumulative Effects

No plants were observed during field surveys although several rock bluffs with potential habitat were located within or adjacent to project areas. This species only grows in a wet rock habitat. Practices associated with this project will not occur within the direct area of this habitat. The project will not create nor eliminate potential habitat for this species, as all rock outcrops and cliffs will be identified and protected during project operations. *No impact* is anticipated to this species.

LANCELEAF TRILLIUM

Environmental Baseline

This species prefers alluvial soils and thrives on floodplains, although it has been observed growing in rocky upland woodlands and brushy thickets.

Direct, Indirect and Cumulative Effects

Although this species was not encountered during field surveys conducted as a part of this Project, potential habitat is present within the project area. Thinning, site preparation and the construction of temporary roads could directly impact individuals if they were present. Other species of trilliums were encountered during field surveys but not this one. *No impact* is anticipated to this species.

BROADLEAF BARBARA'S BUTTONS

Environmental Baseline

This species habitat is described as pinelands and damp woods.

Direct, Indirect and Cumulative Effects

There are no records of this plant being found on Bankhead National Forest. Although this species was not encountered during field surveys conducted as a part of this project, potential habitat is present within the project area. Thinning, site preparation and the construction of temporary roads could directly impact individuals if they were present.

Any species encountered through additional surveys and monitoring will be identified and protected from the direct impacts of equipment during road construction, site preparation or thinning. Proposed treatments such as thinning could potentially have a direct impact upon this species. Small numbers of this species, if present, could be directly or indirectly impacted by this project. The project *may impact* this species however any impact would likely be to randomly occurring, isolated plants and will *not cause a trend to federal listing or a loss of viability*.

PINNATE-LOBED BLACK-EYED SUSAN

Environmental Baseline

This species habitat is described as riparian areas associated with rock outcrops and cliffs.

Direct, Indirect and Cumulative Effects

This species was not encountered during field surveys conducted as a part of this Project. Thinning, site preparation and the construction of temporary roads could directly impact individuals if they were present. Riparian areas associated with rock outcrop and cliff habitats are generally outside of the project area. It is not anticipated that these habitats will not be within the project treatment areas as they were not located during field surveys. *No impact* is anticipated to this species.

DIANA FRITILLARY

Environmental Baseline

This butterfly is described as a woodland species that is associated with stream habitat. Forest Service records do not indicate this species presence on the BNF, but potential habitat is present.

Direct, Indirect and Cumulative Effects

Streamside management guidelines and riparian area protections will mitigate the potential for any impacts on this butterfly's habitat. *No impact* is anticipated to this species.

RAFINESQUE'S BIG-EARED BAT

Environmental Baseline

This mammal uses abandoned buildings and large hollow trees as sites for nursery colonies. According to E. D. Pierson, this species may form roosts under loose sloughing bark of dead and dying trees, in addition to roosts formed in tree cavities (1998). It hibernates in old mines, caves, cisterns and wells in the northern part of its range. According to Best et al., this species usually is not found hibernating in caves in the southern part of its range (1999). This species is often encountered using bridges. The range of this species approximates the historical range of the great cypress swamps, indicating that it may have relied on these sites for roosting and foraging (Bat Conservation International 2001).

Bankhead wildlife staff and cooperators monitor bat populations on the BNF through bat mist netting, harp trapping and surveys of caves and bridges. Rafinesque's big-eared bat has not yet been captured or observed on the Bankhead National Forest, but potential habitat is available.

Direct, Indirect and Cumulative Effects

Thinning of existing pine stands will increase use of these areas by bats in general. Opening up the stands will allow for through flight and foraging. Restoration of southern pine beetle spots will benefit bats by providing foraging areas. Drum chopping prior to restoration should not effect Rafinesque's big-eared bat, as it is not known to use the forest floor as do some other forest bat species. Prescribed burning may create snags, a positive benefit to Rafinesque's big-eared bat. Cool season burning should not harm maternity roosts within forest stands. Providing native forest communities over the landscape; protecting caves; monitoring abandoned buildings and bridges; and maintaining stream health will result in positive cumulative benefits to the big-eared bat if it is present on the BNF. *No impact* is anticipated to this species.

AQUATIC SENSITIVE SPECIES

This section provides information on the determinations of effects on aquatic Forest Service listed Sensitive plant and animal species on the National Forests in Alabama. Other listed species are not discussed due to lack of presence in the geographical area, unsuitable habitat conditions, and/or lack a "high probability of occurrence" on National Forest Lands. Species that are not known from the Bankhead have been excluded from review.

All aquatic habitats will be protected during the implementation of the Forest Health and Restoration Project and will not be directly impacted. Protection mechanisms are in place that will mitigate any negative effects that might be indirect. These mechanisms are presented in the *Mitigation Measures Common to All Alternatives* in Chapter 2 of the Environmental Impact Statement .

CADDISFLIES

Environmental Baseline

Two sensitive species of caddisflies may be found in the BNF. *Hydroptila paralatosia* is found in small streams of the fall line and has been collected in Winston County. *Rhyacophila carolae* has been collected in a small tributary of Bee Branch in the BNF. Caddisflies are confined to water during the majority of their life cycle. Adults of most species are inactive during the day and active during the evening (Harris et al.,1991).

Direct, Indirect and Cumulative Effects

No direct impact from the project is anticipated, as these are aquatic species. However, streamside management zone guidelines will be followed for on every tract. In these instances, heavy equipment will not be utilized within close proximity to streams. Thus, direct physical damage would be prevented. Indirect effects will be avoided by utilization of erosion control efforts where indicated to prevent, reduce or control erosion. Cumulative effects would be minimized if all existing guidelines for the streamside management zone are observed and erosion control is utilized on upland sites.

No impact is anticipated to these species.

DARTERS

Environmental Baseline

Tuskaloosa darter is found in streams with moderate to swift flow. It will be found in cobble, gravel and slab riffles. It has been collected in Sipsey Fork, Borden Creek, Rush Creek and Capsey Creek in the Bankhead. This species was not collected during Biomonitoring in the Upper Mulberry Fork Watershed, 1999-2001 conducted by Geological Survey of Alabama.

The warrior darter is found in small to medium streams with moderate flow. This species will be found in rubble, bedrock, and gravel-filled pools. This species feeds on aquatic insect larvae. Warrior darter has been collected in the following creeks on Bankhead National Forest; Thompson, Borden and Sipsey Fork.

Preferred habitat for the goldstripe darter is described as small sluggish streams, spring seepage areas, and small woodland tributaries, which are adjacent to larger streams. Favored microhabitats include patches of woody debris, leaf material, mud, silt and sand. Records do not indicate that this species has been collected on Bankhead National Forest.

Rush darter has been collected in the Clear Creek system in Bankhead National Forest. Collection sites are characterized as relatively low gradient, small streams with sand substrate and burrweed beds.

Tuscumbia darter is found in limestone spring ponds and runs with aquatic vegetation present. This species is especially sensitive to changes in physical habitat, such as temperature or turbidity. The longhead darter has been collected within the Bankhead National Forest in the Sipsey Fork.

Direct, Indirect and Cumulative Effects

No impact is anticipated on these aquatic species. Streamside management zone guidelines will be followed on every tract. Thus, direct physical damage and downstream effects would be prevented. Erosion control efforts will be utilized where indicated by Forest Service personnel to prevent, reduce or control erosion.

ALABAMA SPIKE, PURPLE PIGTOE, RIDGED MAPLELEAF, SOUTHERN CREEKMUSSEL, SOUTHERN HICKORYNUT, ALABAMA HICKORYNUT, ALABAMA RAINBOW and ALABAMA HEELSPLITTER

Environmental Baseline

Potential habitat for these aquatic species exists on Bankhead National Forest. All of these mussel species require habitat stability, including substrate and water quality. These species are sensitive to water quality degradation; sedimentation being an important factor. Ground disturbing activities within a watershed are potential sediment sources.

Several of these species have been collected in the northern portion of the district, including the Alabama Spike, Southern Creekmussel and the Alabama Rainbow (McGregor, 1992). The Alabama heelsplitter is found in large rivers and is known from the Cahaba River, downstream of Oakmulgee Ranger District. Although it has been recorded in Blount and Jefferson counties, it has not been collected in the Bankhead National Forest.

Direct, Indirect and Cumulative Effect

No impact is anticipated on these aquatic species. Streamside management zone guidelines will be followed on every tract to mitigate potential sedimentation. Direct physical damage to individuals and habitat (substrate) will also be prevented through implementation of streamside management zones and riparian area identification. Erosion control efforts will be utilized by FS personnel to prevent, reduce or control erosion on upland sites as an additional mitigation measure.

LIVERWORTS

Environmental Baseline

These species are somewhat to very rock loving in that they are usually found on more or less vertical rock faces in moist conditions. Liverworts are moss-like, non-vascular plants that grow on damp ground, rocks and tree trunks. There are six species of liverworts, listed as sensitive, that may occur in the Bankhead National Forest. *Cheilolejeunea evansii* is known to occur on

the bark of hardwood trees in humid gorges in North Carolina. In Alabama, this species is reported to be found associated with hemlocks and riparian areas. *Plagiochila echinata* is also found occurring on rocks and stream banks in humid gorges and in the spray zone of waterfalls in North Carolina. *Aneura maxima*, *Pellia appalachia*, *Raudula sullivantii*, *Riccardia jugata* are other species that have been found in similar habitats.

Direct, Indirect and Cumulative Effects

No direct impact on these species is expected, as the proposed activities will not occur within the appropriate type of habitat. The proposed activity may occur in close proximity to these species, but there is no opportunity for indirect impact to the moist, rock habitats where they are found. None of these species were found during field reviews of treatment sites.

No impact is anticipated for these species.

JAMESIANTHUS

Environmental Baseline

This species is associated with, but not limited to, low wet woods or areas commonly considered as streamside management zones. It needs mesic conditions and at least partial shade to survive. Jamesianthus is found in silty sand or gravelly margins of streams, especially where streams cut through limestone, in full or partial sun.

Direct, Indirect and Cumulative Effects

No direct impact is anticipated on this aquatic species. Streamside management zone guidelines will be followed on every tract to mitigate potential sedimentation. Direct physical damage to individuals and habitat (substrate) will also be prevented through implementation of streamside management zones and riparian area identification. Erosion control efforts will be utilized by FS personnel to prevent, reduce or control erosion on upland sites as an additional mitigation measure to prevent indirect impacts. *No impact* is anticipated.

BLACK WARRIOR WATERDOG (this species was evaluated as a candidate for federal listing in section III.B.2.)

Environmental Baseline

This relatively large salamander is found primarily in the Sipsey Fork of the Bankhead National Forest. Its population is apparently restricted to 7 counties within north central Alabama. On the Bankhead National Forest it uses habitat almost identical to that of the flattened musk turtle. This species generally requires clear streams with rocky outcroppings and pools 3 to 5 feet in depth. Surveys for this species were conducted during the 1990's and it was apparently confined to the Sipsey Fork. See the evaluation for this species in section III.B.2.

The determination is *may impact individuals, but not likely to cause a trend to federal listing or a loss of viability*.

Explanation of Determinations for Sensitive Species

Possible Determinations and the Needed Follow-up Actions – The four possible determinations of effects are:

1. “no impact”,
2. “beneficial impact”,
3. “may impact individuals, but not likely to cause a trend to federal listing or loss of viability”,
4. “likely to result in a trend to federal listing or a loss of viability”.

All the possible effects of a proposed action should be included under one of the above determinations. There is no need to consult with the FWS for sensitive species. No action, other than documenting the rationale, is required for determination of “no impact”, “beneficial impact” or “may impact individuals, but not likely to cause a trend to federal listing or a loss of viability”. If the determination is “likely to result in a trend to federal listing or a loss of viability”, the proposed action should be modified to avoid, minimize or rectify the impact. Sensitive species must receive special management emphasis to ensure their viability and to preclude the need for federal listing.

Determination of Effects for Sensitive Species

The proposed activity will have no impact on Rafinesque’s big-eared bat, 27 species of plants, the aquatic habitats of mussels, darters, caddisflies, and the Black Warrior waterdog, which are listed Sensitive Species as per the Regional Forester’s List, revised January, 2002. For Sweet Pinesap and Broadleaf Barbara’s Buttons, the project may impact individuals, but is not likely to cause a trend to federal listing or loss of viability. The project is considered to be beneficial for Clammy Locust. Forest Service is not required to consult or otherwise review potential impacts to sensitive species with FWS. Three species which are contained within the “Sensitive” listing are also being consider for listing with the Fish and Wildlife Service, thus are considered as “Candidate” species including the Black Warrior waterdog, white fringeless orchid, and the fleshy-fruit gladeceess. While they are noted within the sensitive species section, an evaluation is conducted within the BA.

Table BE.C - Determination of Effects Table - Terrestrial Sensitive Species

Common Name	Scientific Name	Effect	Mitigation Measure
Small flowered buckeye	<i>Aesculus parviflora</i>	No Impact	Avoidance
Tennessee Milkvetch	<i>Astragalus tennesseensis</i>	No Impact	Avoidance
Spreading yellow false foxglove	<i>Aureolaria patula</i>	No Impact	Avoidance
Bryson’s sedge	<i>Carex brysonii</i>	No Impact	Avoidance
Alabama larkspur	<i>Delphinium alabamicum</i>	No Impact	Avoidance
Riverbank bush-honeysuckle	<i>Diervilla rivularis</i>	No Impact	Avoidance
Gorge filmy fern	<i>Hymenophyllum tayloriae</i>	No Impact	Avoidance
Butternut	<i>Juglans cinerea</i>	No Impact	Avoidance
Alabama Gladeceess	<i>Leavenworthia alabamica v. ala</i>	No Impact	Avoidance
Fleshy-fruit Gladeceess	<i>Leavenworthia crassa</i>	No Impact	Avoidance
Duck River Bladderpod	<i>Lesquerella densipila</i>	No Impact	Avoidance

Common Name	Scientific Name	Effect	Mitigation Measure
Sweet pinesap	<i>Monotropsis odorata</i>	May Impact <u>1/</u>	
Nevius' stonecrop	<i>Sedum nevii</i>	No Impact	Avoidance
White fringeless orchid	<i>Platanthera integrilabia</i>	No Impact	Avoidance
Yellow fringeless orchid	<i>Platanthera integra</i>	No Impact	Avoidance
Alabama snow-wreath	<i>Neviusia alabamensis</i>	No Impact	Avoidance
Alabama skullcap	<i>Scutellaria alabamensis</i>	No Impact	Avoidance
Blue Ridge catchfly	<i>Silene ovata</i>	No Impact	Avoidance
Jeweled Trillium	<i>Trillium simile</i>	No Impact	Avoidance
Menge's fameflower	<i>Talinum mengesii</i>	No Impact	Avoidance
Little mountain meadow rue	<i>Thalictrum mirabile</i>	No Impact	Avoidance
Clammy Locust	<i>Robina viscosa</i>	Beneficial Impact	
Limestone Fameflower	<i>Talinum calcaricum</i>	No Impact	Avoidance
Lanceleaf Trillium	<i>Trillium lancifolium</i>	No Impact	Avoidance
Broadleaf Barbara's Buttons	<i>Marshallia trinervia</i>	May Impact <u>1/</u>	
Diana Fritillary	<i>Speyeria diana</i>	No Impact	Avoidance
Rafinesque's Big-eared Bat	<i>Corynorhinus rafinesquii</i>	No Impact	Avoidance
Scott's Spleenwort	<i>Asplenium x ebenoides</i>	No Impact	Avoidance
Pinnate-lobed Black-eyed Susan	<i>Rudbeckia triloba</i> var <i>pinnatiloba</i>	No Impact	Avoidance

1/ May impact Individuals but not likely to cause a trend to federal listing or a loss of viability

Evaluation of locally rare species.

Table BE.D - Locally Rare Species List - Terrestrial Species

Common Name	Scientific Name	Ranking	Habitat
Green Salamander	<i>Aneides aeneus</i>	S3G3G4	7
Seepage Salamander	<i>Desmognathus aeneus</i>	S2G3G4	21
Three-corner prairie clover	<i>Dalea carnea var gracilis</i>	G5T3	6
Gattinger's prairie clover	<i>Dalea gattingeri</i>	G3G4	6
A prairie clover	<i>Dalea sp.</i>	G2	6
Little-leaved alumroot	<i>Huechera parviflora var puberula</i>	S3G4T3	18
Small-head gayfeather	<i>Liatris microcephala</i>	S1G3G4	19
Ginseng	<i>Panax quinquefolia</i>	S1G3G4	18
Weft fern	<i>Trichomanes intricatum</i>	G3G4	7
Blue ridge trillium	<i>Trillium stamineum</i>	G3G5	18
Wahoo	<i>Euonymus atropurpurea</i>	S1G5	18
Large whorled pogonia	<i>Isotria verticillata</i>	G5	10
Rock clubmoss	<i>Huperzia porophylla</i>	S1G4	7
Round leaved firepink	<i>Silene rotundifolia</i>	S1S2G4	7
Dwarf bristle fern	<i>Trichomanes petersii</i>	S2G4G5	7
Wild hyacinth	<i>Camassia scilloides</i>	G4G5	6
Sunnybells	<i>Schoenolirion croceum</i>	S2G4	6
Puttyroot	<i>Aplectrum hyemale</i>	S2G5	18
Dutchman's breeches	<i>Dicentra cucullaria</i>	S2G5	18
Columbo	<i>Swertia caroliniensis</i>	G5	18
Prairie Trillium	<i>Trillium recurvatum</i>	S2G5	18
Goldie's fern	<i>Dryopteris goldiana</i>	S1G4	18

Common Name	Scientific Name	Ranking	Habitat
Silky Camellia	<i>Stewartia malacodendron</i>	S2S3G4	18
Mountain Camellia	<i>Stewartia ovata</i>	S2S3G4	11
Alabama Grapefern	<i>Botrychium jenmanii</i>	G3G4 SH	8
Winter Grapefern	<i>Botrychium lunarioides</i>	G4 SH	12
White Trout Lily	<i>Erythronium albidum</i>	G5 S1S2	18
Yellow Trout Lily	<i>Erythronium umbilicatum ssp umbilicatum</i>	G5T5 S1	18
Twinleaf	<i>Jeffersonia diphylla</i>	G5S2	18
Pinesap	<i>Monotropa hypopithys</i>	G5S2	18
Allegheny Spurge	<i>Pachysandra procumbens</i>	G4G5 S2S3	18
Wherry's Catchfly	<i>Silene caroliniana spp wherryi</i>	S1S2	19
Bent Trillium	<i>Trillium flexipes</i>	S2G5	18
Toadshade Trillium	<i>Trillium sessile</i>	S2G4G5	18
Pink lady's slippers	<i>Cypripedium acaule</i>	S3G5	12
Yellow lady's slippers	<i>Cypripedium pubescens</i>	G5	18
Grass-of-Parnassus	<i>Parnassia asarifolia</i>	G4	11
Goldenseal	<i>Hydrastis Canadensis</i>		18
Royal Catchfly	<i>Silene regia</i>	S2G3	6
Nestronia	<i>Nestronia umbellula</i>	S2G4	19

Key to Table - Habitat Associations

1= Cave Habitats

2= Wetland (Bog) Habitats

6= Glades, Prairies & Woodland Habitats

7= Rock Outcrop and Cliff Habitats

8= Grass/Forb Habitats

10= Mid to Late Successional Deciduous Forest Habitats

11= Forest Riparian Habitats

12= Habitat Generalist

11= Forest Riparian Habitats

12= Habitat Generalist

13= Area Sensitive Mid-&Late-Successional
Deciduous Forest Habitats

17= Southern Yellow Pine Forests & Woodland

18= Mixed Mesic Forest Habitats

19= Mixed Xeric Forest Habitats

20=Shrub/Seedling/Sapling Habitats

21=Seeps and Springs

A list of aquatic Forest Service Locally Rare species known, or suspected, to occur, on or near the Bankhead National Forest follows:

Table BE.E - Forest Service Locally Rare Species List - Aquatic Species

Species	Status
Bandfin darter <i>Etheostoma zonistium</i>	S1G3G4
Flame chub <i>Hemitremea flammea</i>	S3G4
Delicate spike <i>Elliptio arctat</i>	S2G4Q
Alligator Snapping Turtle <i>Macrolemys temminckii</i>	RS3G3G4
Blueface darter <i>Etheostoma sp cf. zonistium</i>	Locally Rare

Some species are of concern although not listed as threatened or endangered by the FWS. They have been ranked Globally as G1, G2 or G3 by the Natural Heritage Network of The Nature Conservancy, which means viability concerns throughout their entire range. This may be due to habitat requirements, range limits or particular vulnerability to activities. These species have been listed by the Regional Forester as Sensitive and require special consideration in order to ensure that viability is not impaired and to preclude any trend toward the necessity of their being proposed for listing as threatened or endangered by the FWS. According to the Natural Heritage Network rankings, G1 species are critically imperiled globally because of extreme rarity (typically less than 6 occurrences, less than 1,000 individuals or very few remaining acres) or because of some factor(s) making them especially vulnerable to extinction. Species ranked G2 are imperiled globally because of extreme rarity (typically 6-20 occurrences, 1,000 to 3,000 individuals or few remaining acres) or because of some factor(s) making them very vulnerable to extinction. Species ranked as G3 are rare or uncommon (typically 21-100 occurrences or 3,000 to 10,000 individuals) throughout its range; or found locally, even abundantly, in a restricted range (e.g. in a single state or physiographic region); or vulnerable to extinction throughout its range because of specific factors. Rankings begin with a T instead of a G are used for subspecies and two rankings together, such as G2G3, indicates uncertainty in the ranking of that species. A question mark (?) indicates some doubt concerning the status of the species or subspecies. Rankings preceded by an S indicate the status inside the state of Alabama as determined by the Alabama Natural Heritage Program. The list of plant and animal species is based upon the Southern Region Sensitive Species.

LOCALLY RARE SPECIES

GREEN SALAMANDER AND SEEPAGE SALAMANDER

Seepage salamanders are found within damp, but not wet leaf beds and root masses on the forest floor near springs, seeps, streams and rock houses. This species is found in shaded, moist deciduous or semi-deciduous ravines. Green salamanders are found within damp, but not wet, crevices in shaded rock (sandstone) outcrops, bluffs and ledges. This species is also found in hardwood coves under the bark and in cracks of rotting trees, and stumps. It may be found in pine uplands, particularly Virginia pine and white-pine hemlock with mountain laurel in the understory.

Neither of these species were encountered during field surveys. They are not expected to occur in the project areas, as appropriate habitat is not available. Suitable habitat will not be affected by this project.

THREE-CORNER PRAIRIE CLOVER, GATTINGER'S PRAIRIE CLOVER AND A PRAIRIE CLOVER

These species are known to occur in glades. None of them are known from the Bankhead National Forest, although potential habitat does exist. One species, *Dalea* sp., is known to exist approximately one mile north of the Bankhead National Forest.

No glades or glades associates will be impacted by this proposed project.

LITTLE-LEAVED ALUMROOT

This species occurs in mesic hardwood coves and in riparian areas.

No impact to this species is expected from this project. It was encountered at one location during the field surveys. This area has been identified within the proposed treatment areas for thinning, site preparation or temporary road construction for this proposal. This area will be identified during project activity planning and will be protected throughout the project. This forest health and restoration project will have no direct effect on this species. And, riparian areas will be protected through the established guidelines for streamside management zones.

SMALL-HEAD GAYFEATHER

This species is found on sandstone and in dry barrens. It is also described as occurring in old fields, meadows and clearings.

This species was encountered on one field survey of a project area. This was the first instance known to Forest Service personnel that it has been recorded from Bankhead National Forest. This area has been identified within the proposed treatment area for thinning, site preparation or temporary road construction for this proposal. This area will be identified during project activity planning and will be protected throughout the project. This forest health and restoration project will have no direct effect on this species.

WEFT FERN

This fern is found in rock houses and spray cliffs. Neither this species nor the appropriate habitat was encountered during field surveys. This species has not been recorded in the Bankhead National Forest. Suitable habitat will not be effected by this project.

WAHOO, GOLDENSEAL, PUTTYROOT, DUTCHMAN'S BREECHES, BLUE RIDGE TRILLIUM, PRAIRIE TRILLIUM, COLUMBO AND GINSENG

These plants are found primarily on, but not limited to, limestone-derived soils, heavy clay-like soils associated with floodplain woods or calcareous mesic woods. Wahoo occurs along stream banks and in rich mesic woods. Goldenseal is found in mostly mature deciduous woodlands,

usually in rich soils over limestone. Puttyroot is found in heavy soils of floodplains and low rich woods. Dutchman's breeches is found in rich woods, north facing slopes and stream banks. Blue ridge trillium is found in rich mesic woods, occurring on heavy clays in the floodplains of small streams. It is often found in association with red buckeye. Prairie trillium is found in rich mesic woods on slopes, along streams and in floodplains, often associated with mixed or loamy/clay soils. Columbo is found in rich woods on cool slopes in mesic areas or open woodlands. Ginseng is found on rich mesic slopes, alluvial deposits, and in hardwood coves.

Puttyroot was found on one project area during field surveys. This area has been identified within the proposed treatment area. These sites will be identified during project activity planning and will be protected throughout the project. This forest health and restoration project will have no direct effect on this species.

The Blue Ridge trillium was encountered at several locations during field surveys for this project. These areas have been identified within the proposed treatment areas for thinning, site preparation or temporary road construction. These areas will be identified during project activity planning and will be protected throughout the project. This forest health and restoration project will have no direct effect on this plant species. No individual plants of these species should be impacted by this project.

Ginseng was also located on at least two sites during field surveys. These areas have been identified within the proposed treatment areas for thinning, site preparation or temporary road construction. These sites will be identified during project activity planning and will be protected throughout the project. This forest health and restoration project will have no direct effect on this species.

WHERRY'S CATCHFLY and ROYAL CATCHFLY

Wherry's catchfly is found in sandy, rocky upland woods with calcareous soils. The royal catchfly is also known from dry woods, prairies and rocky openings in well-drained calcareous or cherty soils. Neither of these species was encountered during field surveys. Potential habitat is available within the proposed project area, but should not be negatively impacted.

PINK LADIES SLIPPER

This species is most often associated with mesic woods habitat. Only a few sightings of Pink Ladies Slipper are recorded on Bankhead. It is not known to occur within the proposed tracts.

No negative impact is expected for this species as the project should avoid its habitat.

YELLOW LADY'S SLIPPER

This species is found in bogs, swamps, and woodlands. Individuals have been recorded in the Bankhead National Forest, although none were encountered in the project area. These areas will be avoided by this project and protected by streamside management zones.

GRASS-OF-PARNASSUS

This plant is found in bogs and springs and on wet slopes. This species was not encountered during field surveys and appropriate habitat will not be impacted by the project.

LARGE WHORLED POGONIA

This plant is found in acid woods, both moist and dry. It is also found along stream margins. This plant was encountered during field surveys on one site. This site has been identified within the proposed treatment area. This area will be identified during project activity planning and will be protected throughout the project. This forest health and restoration project will have no direct effect on this plant.

NESTRONIA

This species is most often associated with mesic woods and rocky dry woods habitat. It can occur in pine stands on dry sites, and most often occur in the dry xeric upland oak/hickory/shortleaf pine overstory community types. There are numerous colonies of Nestroneia on the Bankhead National Forest and this particular plant has shown vigorous resprouting and vegetative growth after disturbance from fire and some logging operations. It is a nondescript plant and sometimes found in small, isolated groups.

This plant was encountered during the field surveys for this project. The sites on which this plant was identified will be identified during project planning activity. Practices will be planned with full consideration of its presence and viability. Any practice that is considered to be detrimental to the long term survival of this plant will be avoided.

There is potential that small, individual populations of this plant may be impacted by this project but it would not lead toward a federal listing of the species or result in a loss of viability for the species.

ROCK CLUBMOSS, ROUNDEAVED FIREPINK AND DWARF BRISTLE FERN

These plants are associated with sandstone outcrops or cliffs. The clubmoss is found in shaded crevices, cliffs and ledges of sandstone. The firepink is found in crevices of dry sandstone cliffs and ledges, at or near the bluff line, in full to nearly full sun. The bristle fern is found on shaded moist rocks (epipetric) of sandstone cliffs and overhanging ledges, and large shaded boulders and sometimes on the bases of tree trunks.

There will be no impact to these species, as the proposed project will not impact these habitats.

WILD HYACINTH AND SUNNYBELLS

Sunnybells are most often associated with well-drained, sandy soils, and with pinelands or cedar glades. There is usually a surface to subsurface water flow in connection with these sites, although it may only be seasonal. The hyacinth is associated with cedar glade woodlands, and also with low-lying calcareous alluvial deposit first terrace riparian micro-sites.

There will be no damage to individual plants, as the proposed project will not impact these habitats.

SILKY AND MOUNTAIN CAMELLIAS

These are understory shrub species. These two camellias are very similar in appearance. The mountain camellia, is found in moist rich soils along stream margins. The silky camellia is found in moist rich woods. Both species were found during field surveys of the some proposed treatment areas. They were primarily located within the stream side management zones of the treatment compartment although in some cases they were found in other areas. They will not be impacted by the project, as streamside management guidelines are in place and the proposed project should not occur within these areas.

These areas have been identified within the proposed treatment areas for thinning, site preparation or temporary road construction. These areas will be identified during project activity planning and will be protected throughout the project. This forest health and restoration project will have no direct effect on this plant species. No individual plants of these species should be impacted by this project.

GOLDIE'S WOOD FERN

Goldie's wood fern is a terrestrial species, found in damp woods and on stream banks. It is often found growing among rocks and it is occasionally epipetric at the base of cliffs. It is not expected to be found in the Bankhead National Forest. These habitats are not expected to be impacted by the proposed project.

ALABAMA GRAPEFERN and WINTER GRAPEFERN

Alabama grapefern is found on wooded slopes with loamy, subacid soil and in old fields. In Tennessee, it has been encountered in wet pinelands, ravines and dry hillsides underneath pines. The winter grapefern's habitat is described as sandy slopes of dry, open woods with subacid soil and in old fields. Potential habitat for these two species exists in BNF. Neither species has been recorded from Bankhead, nor were they encountered during field surveys. While individuals may be impacted by this project, there should be no loss of populations that would result in a trend toward federal listing.

WHITE TROUT LILY and YELLOW TROUT LILY

The white trout lily is very rare in Alabama. According to Dean et. al, it is only known from one limestone hillside in the Tennessee Valley and from Cullman County. It has not been encountered in Bankhead National Forest.

The yellow trout lily is found in alluvial woods and rich, moist deciduous woodlands, coves, ravines and along streambanks. The more common trout lily, *Erythronium rostratum*, is frequently encountered in the Bankhead National Forest. No negative impact is expected for populations of these species.

TWINLEAF

Habitat for this species is described as rich, damp, open woods. This species was not encountered during field surveys. No negative impact is expected for this species as the habitat for the species should not be within proposed treatment areas.

PINESAP

This species may be found in upland, moist woods. It was not encountered during field surveys for this project. Potential habitat is present within the proposed project area, but should not be impacted by the project.

ALLEGHENY SPURGE

This species is found in mesic hardwood forests over limestone. It is known to occur within Bankhead National Forest, but was not encountered during field surveys for the proposed project. Appropriate habitat was not encountered within the project area. This species will not be impacted.

BENT TRILLIUM and TOADSHADE TRILLIUM

Bent trillium is known to occur on rich wooded slopes, over limestone-derived soils, in stream valleys, on upper alluvial plains, and in rich woods on higher floodplains. Toadshade trillium is also found in rich woodlands, over limestone and calcareous soils, in floodplains, and on riverbanks. This species has also been encountered in high, dry limestone woods.

Both of these species occur on Bankhead National Forest. Neither was encountered during field surveys for the proposed project. This species will not be impacted by this project.

Aquatic Locally Rare:

ALLIGATOR SNAPPING TURTLE

Alligator snapping turtles are associated with deep rivers and canals primarily, but may be found in lakes and swamps that are located in close proximity to deep water. This is an aquatic turtle, which emerges for nesting purposes. This species requires fish and mollusk populations for feeding and undeveloped areas for nesting.

Alteration of large river systems is detrimental to this turtle. This project will not affect the habitat of this species. No turtles were encountered during the field surveys.

BANDFIN DARTER AND FLAME CHUB AND UNDESCRIBED BLUEFACE DARTER

The Bandfin darter and Flame chub are both common species in the lower Tennessee drainage; the darter in Kentucky, Mississippi, Tennessee and northwest Alabama, including Bear Creek on the BNF and the chub in Tennessee and north Alabama. The darter, however, has only one known population in the Mobile drainage. It is found in Hubbard Creek and its tributaries above Kinlock Falls on the BNF. The species has been collected in Hubbard, Basin, Whitman and Maxwell Creeks. Dycus and Howell (1974) suggested that the species entered the Hubbard Creek drainage by stream capture or some other method from nearby Bear Creek in the Tennessee drainage. Kinlock Falls and competition from other fish may have hindered its distribution out of Hubbard Creek. The Bandfin darter in the Tennessee drainage inhabits coastal plain streams with low gradients and fine gravel to sandy substrates. In the Mobile drainage, the species inhabits cool streams with abundant areas of boulder and bedrock substrates. This darter is common throughout most of its range, but it was listed as a Locally Rare Species because it has such a limited distribution in the Mobile drainage. The flame chub is found in springs and small spring fed streams in the Tennessee River drainage. On the Bankhead NF it is known from tributaries of Flint Creek. The undescribed blueface darter is known from the Black Warrior and Tennessee drainages. At this time, the habitat has not been described.

No impact is anticipated on these aquatic species. Streamside management zone guidelines will be followed on every tract to mitigate potential sedimentation. Direct physical damage to individuals and habitat (substrate) will also be prevented through implementation of streamside management zones and riparian area identification. Erosion control efforts will be utilized by FS personnel to prevent, reduce or control erosion on upland sites as an additional mitigation measure.

DELICATE SPIKE AND ALABAMA HEELSPLITTER

The Delicate spike is found in small to medium headwater streams. It has been recorded in Blount, Cherokee, DeKalb, Jefferson, Macon, and Tuscaloosa counties. It has not been collected in the Bankhead National Forest. The Alabama heelsplitter is found in large rivers and is known from the Cahaba River, downstream of Oakmulgee. It has been recorded in Blount and Jefferson counties. It has not been collected in the Bankhead National Forest.

Mussel species will not be impacted by this project, as appropriate guidelines are in place regarding streamside management zones. Additionally, neither of these species is expected to occur in the project area.

Mitigation Measures

Measures to mitigate any potential damage to habitat of threatened, endangered, sensitive or locally rare species of plants or animals include active and passive ones. Biological staff was involved in all aspects of project planning. All sites have streamside management zones and the related protection guidelines in place, thus no indirect or cumulative effects are anticipated downstream. Any temporary road that has significant potential for producing soil erosion will be rehabilitated with appropriate erosion control measures as have been fully explained within the body of the biological assessment or the mitigation measures as identified within the body of this report.

All areas where locally rare species were found during the field surveys have been identified within the proposed treatment areas. These areas will be identified during project activity planning phase and will be protected as needed to protect the species throughout the project. This forest health and restoration project will have no direct effect on these plant species. No individual plants of these species should be impacted by this project.

Determination of effects for locally rare species

The activity is not expected to have an impact upon locally rare species. While some individual plants within the proposed project areas may be affected, these impacts to individuals or parts of a population will probably not lead to any trend toward federal listing or loss of viability.

This Biological Evaluation was prepared by the Wildlife Staff at Bankhead National Forest. Significant contribution to this included assistance from Michail A. Crump, Hydrologist trainee and Allison Cochran, Biological Science Technician at Bankhead National Forest. Allison is also certified as an Associate Wildlife Biologist with The Wildlife Society.

Biological Evaluation Prepared and Approved by: _____

TOM COUNTS

District Wildlife Biologist

Date Signed _____

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